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ADMINISTRATIVE REMOVAL

ASA219

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A-80-40

IV-F-2

MEMORANDUM

DATE: December 1, 1983

TO: Docket No. A-80-40 (ESED Project No. 83/21)
FROM: Janet Meyer
SUBJECT: Written Statements Submitted by Speakers at the Washington, D.C., Public Hearing on the Proposed NESHAP for Inorganic Arsenic

Attached are the written statements submitted by 13 speakers at the public hearing on the proposed NESHAP for Inorganic Arsenic held in Washington, D.C., on November 8, 1983. The written statements of three additional speakers who commented on the standards for the copper industry are not available at this time. When copies of these statements are obtained they will be added to the docket. The names and affiliations of the 13 speakers are listed below.

Speaker	Affiliation
Mr. Robert Malone	Kennecott Copper
Dr. Lydia Salmon	Kennecott Copper
Dr. Hallett A. Lewis	Consultant to Kennecott Copper
Mr. Theodore L. Cogut	Phelps-Dodge
Dr. Stephen H. Lamm	Consultant to Phelps-Dodge
Mr. M.O. Varner	ASARCO, Inc.
Mr. C.K. Guptill	ASARCO, Inc.
Mr. Charles R. Counts	ASARCO, Inc.
Mr. D.E. Holt	ASARCO, Inc.
Mr. Lawrence Lindquist	ASARCO, Inc.
Mr. Donald A. Robbins	ASARCO, Inc.
Mr. David Doniger	National Resources Defense Council
Mr. Blake Early	Sierra Club

Attachment

AR 18.3.8 0015

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MEMORANDUM

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AR 18.3.8 0015

STATEMENT OF ROBERT A. MALONE
ON BEHALF OF KENNECOTT
BEFORE THE EPA ARSENIC PANEL
WASHINGTON, D.C.
NOVEMBER 8, 1983

I am Bob Malone, Corporate Director of Environmental Affairs for Kennecott in Salt Lake City, Utah.

Kennecott is the nation's largest copper producer, accounting for 23 percent of domestic copper production, and operates mining, concentrating, smelting and refining operations in Utah, New Mexico, Arizona, Nevada, and Maryland.

Kennecott, like many businesses, has been hard hit by the recession. Current copper prices are approximately 60¢/lb, a level, in real terms, not experienced since the great depression.

Few, if any, domestic producers are able to cover costs of production at these price levels. Most operations either shut down completely or drastically curtailed production during 1982, and domestic smelter production was 26 percent lower than previous year output.

The impact on our domestic operations has been devastating. In 1980 our employment stood at 12,300. Today we have reduced our work force to 7,000. The 5,300 employee reduction includes 1,350 through temporary facility closures. In 1982 we incurred a loss of \$189 million, and even with

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ambitious cost reduction measures are realizing this year a third quarter cumulative loss of \$66 million.

EPA's BAT proposal would require Kennecott to invest an additional \$35.5 million into three of its four smelters and incur an annual increase in operating costs of \$5.25 million. Total annualized costs would be \$11.3 million. The additional capital costs to modify our smelters to attain the EPA BAT proposal would be equivalent to approximately 2¢/lb. of copper.

It is Kennecott's position that its smelters should not be regulated under Section 112 of the Clean Air Act for arsenic emissions because they do not cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health. In support of this position we plan to submit detailed written comments by December 10 in accordance with the Notice of Proposed Rulemaking, addressing the questions raised there. I will not try to cover all of those questions today, but would like to point out some of the highlights.

EPA BAT Proposal

This slide shows which smelters would be regulated. The smelters are listed in descending order of arsenic in the feed to the converters -- not total arsenic fed to the smelter,

just that fed to the converters. EPA calculated the cost of installing its definition of BAT for each smelter and divided it by the Mg of arsenic reduction it estimated would be achieved to determine an annual cost per Mg captured for each smelter. Then it used cost-benefit comparisons to draw the line shown here, to determine which smelters would be required to install BAT, and then decided what risk would remain.

That process seems to us to put the cart before the horse. Since the object is to protect people, we think the focus should be on output of arsenic, not input, and selection of smelters to be regulated on the basis of the risk to public health, not just what EPA thinks particular smelters can afford.

As an alternative to its BAT proposal, EPA has suggested such a risk proposal. Under the proposal EPA groups smelters according to the risk of cancer in the area of the smelter, then applies its BAT regulation to those smelters where risk is thought to be significant.

Under the risk approach as proposed in the Federal Register, the only Kennecott smelter that would be regulated is the one at McGill, Nevada. McGill is shown as a high-risk smelter because EPA based its calculations on 1982 data. This caused two problems.

First, it made McGill's smelter feed high in arsenic, when normally it is low. This stems from the fact that in 1982

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following closure of the Anaconda smelter, McGill custom smelted Anaconda concentrates from its Butte, Montana, mine, which are second only to ASARCO, Tacoma, concentrates in arsenic content. The Butte mine is now closed, so McGill no longer smelts those high-arsenic concentrates, and has no plans to do so. Before and after the temporary 1982 situation, McGill's smelter feed was low-arsenic concentrate, and that is what is anticipated for the future.

Second, EPA's use of 1982 for baseline smelter controls understated the amount of arsenic capture at McGill. For all other smelters, anticipated improvements were included in the baseline configuration. The same course should be followed for McGill.

Correcting the data used in EPA's assessment for these two items would remove McGill from proposed additional regulation under both of the alternatives for which it is now listed -- BAT and Risk.

The McGill smelter doesn't provide a good illustration of our objection to EPA's BAT proposal, because of the special circumstances I have just been talking about, but the Utah smelter does. It is a large, modern smelter with arsenic in its feed, located near a large city. It has excellent arsenic capture and poses no health threat to its neighbors --

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EPA puts the risk at one cancer case in 2,000 years to one in 100 years, and admits these estimates may greatly overstate the risk. This would seem to be an absolutely clear case of no need for regulation. Yet EPA's BAT proposal would impose additional controls which would provide negligible additional capture, would make no measurable improvement in ambient air quality, and would be very expensive as shown on the previous slide.

We think this is obviously a case of regulatory overkill and the same is true of our Hayden smelter. Present capture is high and EPA agrees the smelter would not be regulated if risk is to be the criterion. Yet EPA's BAT proposal would impose additional controls which would be very expensive. This is not only regulatory overkill, it is overkill with an unfair competitive edge, a problem inherent in the BAT approach, as EPA recognizes. That is one of our principal objections to the BAT approach -- it creates artificial competitive advantages for some companies and disadvantages for others that are not based on any need to capture arsenic but, rather, are based on ability to pay for capture equipment.

Finally, we disagree with EPA's assessment of risk. We have retained expert consultants on epidemiology and risk assessment to examine the materials EPA relied on in making

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its risk assessment. They have concluded that community epidemiological studies show no evidence of risk to the public arising from the levels of arsenic in the ambient air surrounding Kennecott's smelters. These findings will be discussed by Kennecott's medical consultant, Dr. H. A. Lewis. We have also recomputed EPA's original risks for our smelters in Utah, Arizona, and Nevada based on more recent data, as EPA has indicated it intends to do, and this modeling will be discussed by our next witness, Dr. Lydia Salmon.

We agree with the approach to risk assessment and risk management advocated by Administrator Ruckelshaus in his July 13 remarks to the Isaac Walton League in Harrisburg, Pennsylvania. There he warned that the funds available for environmental improvement are not unlimited, and should be spent on the projects that contribute the most to environmental and public health protection after "thorough and explicit consideration of risks and costs." (Remarks, pp. 7-8). Kennecott has already spent or committed over three quarters of a billion dollars to improve the environment in the vicinity of its smelters and we have no doubt additional expenditures will be required in the future. But our funds are not unlimited, and we cannot afford to spend vast sums to install unneeded equipment to deal with hypothetical risks.

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That would be the case under the BAT proposal here. We advocate instead the risk assessment approach proposed by Administrator Ruckelshaus' speech. Under that approach, we believe EPA will reach the same conclusion we have, that Kennecott's smelters pose no significant risk to the public and require no additional arsenic controls.

KENNECOTT OPERATIONS

	<u>status</u>	<u>employees</u>
Utah	Operating	4900
Arizona	Closed	<700>
Nevada	Closed	<250>
New Mexico	Operating	1100
Maryland	Closed	<400>

1982 Loss <\$189 million>

1983 Loss YTD <\$66 million>

Effect of EPA BAT Proposal on Kennecott

	<u>millions of dollars</u>	
	<u>capital</u>	<u>operating</u>
Utah	18.5	2.65
Arizona	8.0	1.2
Nevada	9.0	1.4
New Mexico	<u>-0-</u>	<u>-0-</u>
	35.5	5.25

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EPA BAT Proposal

<u>smelters</u>	<u>converters</u>	<u>furnaces</u>
-----------------	-------------------	-----------------

ASARCO-El Paso	x	x
ASARCO-Hayden	x	x
Kennecott-McGill	x	x
Kennecott-Utah	x	x
PD-Morenci	x	-
Kennecott-Hayden	x	-
PD-Douglas	-	-
PD-Ajo	-	-
Inspiration-Miami	-	-
PD-Hidalgo	-	-
Copperhill	-	-
Magma-San Manuel	-	-
Kennecott-Hurley	-	-
White Pine	-	-

basis: cost benefit

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- Attachment 2 of A-80-40 IV-F-2 -

STATEMENT OF LYDIA S. SALMON, Ph.D.
ON BEHALF OF KENNECOTT
BEFORE THE EPA ARSENIC PANEL
WASHINGTON, D.C.
NOVEMBER 8, 1983

I am Dr. Lydia Salmon, a Systems Analyst for Kennecott in Salt Lake City, Utah.

Kennecott has recalculated risks due to smelter arsenic emissions from three of its four smelters, primarily because the emission rates used by EPA were incorrect or inappropriate. At the same time, we used 1980 census data and EPA's newest risk factors (from the draft Health Assessment Document for Inorganic Arsenic).

Today I will briefly summarize the results of the calculation for each smelter; the details will be submitted in our written comments. The first transparency compares the risks calculated by Kennecott and by EPA for Kennecott's Utah smelter. In this case, we made two corrections to the emission rates:

- 1) The figure we gave EPA for stack emissions already includes captured fugitive emissions, so only escaped fugitive emissions need be estimated.

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- 2) We estimated escaped fugitive emissions based on measured SO₂ emissions from the smelter roof vents.

The results are shown:

- 1) 1 cancer death in 290-1,700 years (compared to EPA's 1 in 100-2,000 years) in the vicinity due to smelter arsenic.
- 2) Odds of 1-5 in a million (compared to EPA's 1.6-26 in a million) of one individual in the highest-concentration spot in the populated area dying of lung cancer due to smelter arsenic.

The Utah smelter is well within EPA's suggested criteria for a low-risk smelter.

The second transparency compares the two calculations of risk due to Kennecott's smelter in Hayden, Arizona. Here, EPA used an erroneous figure for stack emission. We have used the same figure we gave EPA. Since at the present we lack the necessary information to estimate fugitive emissions, we used EPA's estimate.

The results are shown:

- 1) 1 cancer death in 150-925 years (compared to EPA's 1 in 40-600 years) in the area due to smelter arsenic.

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- 2) Odds of 4.5-27 in 100,000 (compared to EPA's 43-690 in 100,000) of an individual in the highest-concentration populated spot dying of lung cancer due to smelter arsenic.

This smelter is also within EPA's suggested criteria for a low-risk smelter.

The third transparency compares the two results for Kennecott's smelter in McGill, Nevada. In this case, the emission figures EPA used were for a period when the McGill smelter processed high-arsenic concentrates from the Butte, Montana, mine. As you know, the Butte mine has shut down. Thus, use of those figures is inappropriate for assessing future risks. We have taken an average value for more normal concentrates to compute a typical emission rate for risk assessment.

The results are shown:

- 1) 1 cancer death in 88-540 years (compared to EPA's 1 in 10-200 years) in the area.
- 1) Odds of 1.7-13 in 10,000 (compared to EPA's 43-690 in 10,000) in an individual in the highest-concentration populated spot dying of lung cancer due to smelter arsenic.

With appropriate emission rates, the latest population figures and the new risk factors, the McGill smelter is a low-risk smelter under EPA's suggested criteria.

EPA's calculation indicated that Kennecott's smelter in Hurley, New Mexico, is low-risk; we agree with that judgment, and we are convinced that it would not be altered by the new population figures or the new risk factors.

Let me emphasize that these risk assessments are upper bounds on risk; actual risks could easily be much lower. The calculation of exposure involves a number of simplifying assumptions, such as:

- 1) People stay in or near their homes all their lives.
- 2) Indoor air has the same arsenic concentration as outdoor air.

Furthermore, the risk factors used are based on extrapolation from effects on workers exposed to high arsenic concentrations to effects on the general public exposed to quite low concentrations. This extrapolation used the unproven linear no-threshold model for inorganic arsenic. As EPA has said,

The quantitative risk estimate based on the application of the linear no-threshold model represents a plausible upper-limit estimate in the sense that the risk is probably not higher than the calculated level and could be much lower. 48 Fed. Reg. 33114.

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Revised* Modeling Decreases Risk Estimate at Kennecott Utah

	<u>This Estimate</u>	<u>EPA Background Document</u>
Population Exposed	112,000	79,200
Expected Annual Cancer Incidence	1 in 1700 yr-1 in 290 yr	1 in 2000 yr-1 in 100 yr
Maximum Individual Lifetime Risk	0.8 in 1,000,000-5 in 1,000,000	1.6 in 1,000,000-26 in 1,000,000
Risk Level (EPA Suggested Criteria)	Low	Low

*Corrected Emission Rates
1980 Census Population Figures
Risk Factors from Health Assessment Document
for Inorganic Arsenic (Review Draft)

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Revised* Modeling Decreases Risk Estimate at Kennecott Hayden

	<u>This Estimate</u>	<u>EPA Background Document</u>
Population Exposed	7718	8700
Expected Annual Cancer Incidence	1 in 925 yr-1 in 150 yr	1 in 600 yr-1 in 40 yr
Maximum Individual Lifetime Risk	4.5 in 100,000-27 in 100,000	43 in 100,000-690 in 100,000
Risk Level (EPA Suggested Criteria)	Low	Low

*Corrected Emission Rates
1980 Census Population Figures
Risk Factors from Health Assessment Document
for Inorganic Arsenic (Review Draft)

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Revised* Modeling Decreases
Risk Estimate at Kennecott Nevada

	<u>This Estimate</u>	<u>EPA Background Document</u>
Population Exposed	7156	4500
Expected Annual Cancer Incidence	1 in 540 yr - 1 in 88 yr	1 in 200 yr - 1 in 10 yr
Maximum Individual Lifetime Risk	1.7 in 10,000 - 13 in 10,000	43 in 10,000 - 690 in 10,000
Risk Level (EPA Suggested Criteria)	Low	High

*Corrected Emission Rates
1980 Census Population Figures
Risk Factors from Health Assessment Document
for Inorganic Arsenic (Review Draft)

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STATEMENT OF HALLETT A. LEWIS, M.D.
ON BEHALF OF KENNECOTT
BEFORE THE EPA ARSENIC PANEL
WASHINGTON, D.C.
NOVEMBER 8, 1983

The Federal Register Vol. 48, No. 140, July 20, 1983 under Proposed Standards for Inorganic Arsenic on Page 33113 states "the measured concentration of arsenic in the ambient air, and the report of excess cancer not only among workers but among populations living near sources led to the Administrator's judgment that inorganic arsenic causes or contributes to air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness."

I have reviewed all of the community epidemiological studies referenced in the Draft Health Assessment Document for Inorganic Arsenic (EPA-60018-83-021A) and others relating to this subject and found 16 community mortality and morbidity studies. I have not attempted to estimate the total community population potentially at exposure which are represented in these studies. However, in total they would tend to overcome the criticism that the epidemiologic method would not have the power to pin-point a small excess of lung cancers from the expected background of lung cancers because of the small

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populations represented in each individual study. Ten of these studies are lung cancer mortality studies and six are morbidity studies of communities near copper smelters.

Of the ten lung cancer mortality studies only the Matanoski census tract study near a plant producing calcium and lead arsenate, arsenic acid, paris green, and sodium arsenite showed an increase in lung cancers and these occurred only in males in the census tract containing the plants between 1966-1974 with no increase in lung cancer seen in the years between 1958-1962. In studies from the communities with probably the highest potential for arsenic exposure in their populations (Pershagen, et al. 1977, Polissar, et al. 1979 and Hartley, et al. 1982) no increase in lung cancer mortality was shown in the persons residing in the community near the smelter. The Blot & Fraumeni study shows an increase in lung cancer mortality in 36 counties with copper, lead and zinc smelters and refineries when compared to other U.S. counties. However, when the lung cancer rates are compared with the rates for all other counties in the same state during the same times, these excesses disappear. The Newman study showed excesses in two cities near copper mining and smelting facilities, but not in the county as a whole.

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Review of the six community morbidity studies shows only one finding which appears of possible potential significance and that is a finding in the Nordstrom, et al. 1978 study where women living near the smelter were found to deliver infants weighing slightly less on the average than those at distances from the smelter. No increase in spontaneous abortions or congenital malformations was seen in this group.

My conclusion from this review is that these studies show no increase in lung cancer mortality or any significant morbidity in the potentially exposed population in communities in areas about both high and low arsenic emitters. In total they represent a significant population group which have had potential arsenic exposure for a number of years and if there was discernable lung cancer excess or morbidity it would be reasonable they would show somewhere in these studies. These studies do not support the Federal Register statement that excess mortality or morbidity exists for populations living near arsenic emitting sources.

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TESTIMONY OF THEODORE L. COGUT
SUPERVISOR OF ENVIRONMENTAL SERVICES FOR THE MORENCI BRANCH
PHELPS DODGE CORPORATION
BEFORE THE
ENVIRONMENTAL PROTECTION AGENCY

Submitted November 8, 1983

Good morning. My name is Theodore Cogut and I am the Supervisor of Environmental Services for the Morenci Branch of the Phelps Dodge Corporation's Western Operations. For the past four years I have been supervising all environmental matters at the Morenci Branch under the jurisdiction of the Environmental Protection Agency. As supervisor, I am responsible for achieving compliance with federal and state environmental laws and standards at Branch operations. I am also responsible for the administration of the Consent Decree referred to in Mr. Mendola's testimony at both the Morenci and Ajo operations. For five years, prior to 1979, I acted as Chief Meteorologist for the Morenci Branch working on air quality matters including the Morenci Supplementary Control System which is based on the Morenci Clean Air Prediction System, called "MCAPS." In the course of my duties as Supervisor and earlier as Chief Meteorologist, I have also been involved in assessing the economic impact of environmental regulations and controls at Morenci.

Mr. Mendola briefly discussed the communities of Morenci and Ajo, Arizona in which two of the Phelps Dodge smelters are located. I would like to talk about the role Phelps Dodge plays in these smelter communities and the state of Arizona.

Phelps Dodge has spent hundreds of millions of dollars in these communities to carry out its corporate policies of complying

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industry of which Phelps Dodge is a part directly paid over 116.2 million dollars in state, local and school taxes. One year later in the midst of the worst slump in the industry in more than fifty years, that same industry still paid taxes of nearly 105 million dollars. In 1981 the industry paid 690 million dollars in wages and salaries for its workers and purchased slightly less than 770 million dollars from Arizona businesses. Those wages and purchases, in turn, contributed to the communities and the state through taxes and wages to the people who work in the many businesses that support the mining industry. In the communities of Morenci and Clifton Arizona, Phelps Dodge directly or indirectly provided 3.5 million dollars in 1982 to the school district alone. In the smaller community of Ajo, the contribution was slightly less than one million dollars.

It is clear that Phelps Dodge has an interest in the communities and the states of which it is a part. Phelps Dodge has demonstrated a strong commitment to the protection of the health of the people in the smelter communities, whether expenditures of money to protect health are required by law and regulation or not. For example, Phelps Dodge maintains and operates accredited private hospitals in Ajo and Morenci, providing health care services at nominal cost for Phelps Dodge employees and other smelter community residents. Moreover, Phelps Dodge has established comprehensive industrial hygiene programs, staffed with professional industrial hygienists at all smelter operations. These programs prescribe hygiene procedures beyond the requirements of federal regulation.

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reported by the EPA in the 20 July 1983 Federal Register. Applying the actual arsenic levels in matte to EPA's conservative capital and operating cost estimates, the annualized cost to install and operate air curtains would increase from the published figure of \$302,900 to at least 3.1 million dollars per megagram reduced. Preliminary computations of these annualized costs were made by environmental and engineering personnel of Phelps Dodge. Copies of the final computations will be included in Phelps Dodge's detailed written comments to be submitted before the record closes. We at Phelps Dodge believe, as did the EPA on page 33143 of the 20 July 1983 Federal Register, that "the costs and economic impacts are disproportionate to the emission reduction benefits" to those smelters which fall in the range of \$700,000 to \$8 million per megagram of arsenic removed. Under the circumstances these controls should not be required.

Phelps Dodge, and indeed the entire U.S. copper industry, is facing another year of poor copper market conditions with the price of copper well below the breakeven point. It is interesting to note that 119 years ago in 1864 copper sold for 55 cents per pound. Today Phelps Dodge is selling copper for 68 cents per pound. In the third quarter of 1983, Phelps Dodge posted a loss of \$28 million dollars. We believe it is inappropriate to impose further expenditures for added controls when those controls will not result in any demonstrable improvement or protection of the health of the people living in the community of Morenci.

As I have stated earlier, Phelps Dodge remains committed to compliance with the environmental laws and regulations and to

Theodore L. Cogut

Resume

Employment

- Four years, Environmental Services Supervisor, Morenci Branch, Phelps Dodge Corporation
- Five years, Chief Meteorologist, Morenci Branch, Phelps Dodge Corporation
- One year, Research Assistant in Acoustic Doppler Meteorology, University of Oklahoma
- One year, Chief of Corps Artillery Meteorological Quality Control Team, I Corps Area of Vietnam, U.S. Army
- Two years, Instructor in Meteorology and Chief of Programmed Instruction Development, Meteorology Division, U.S. Army Artillery and Missile School
- One year, Battalion Artillery Meteorological Office, Central Highlands of Vietnam, U.S. Army
- Three years, Environmental Analyst, Environmental Technical Applications Center, Washington, D.C., U.S. Air Force
- Eleven years, Aviation Weather Forecaster; Michigan, Saudi Arabia, New Hampshire, Bermuda; U.S. Air Force

Professional Memberships

- Industrial Meteorology Committee, National Weather Association
- American Meteorological Society, past President and Charter Member of Southern Arizona Chapter
- American Institute of Mining Engineers
- Air Pollution Control Association

Awards, Honors

- Legion of Merit
- Bronze Star Medal
- Phi Kappa Phi, National Collegiate Academic Honorary

Education

- BA with honors, University of Maryland
- MA in teaching, Wayne State University
- One year additional graduate work in meteorology, University of Oklahoma
- Graduate of seven Air Force and Army Meteorological Schools

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Written Accomplishments

- Article on the Morenci Clean Air Prediction System (MCAPS), Engineering and Mining Journal, April, 1978
- Programmed instruction booklet: Ballistic Wind Plotting
- Directed preparation of Army, Navy, Air Force Engineering Design Manual on heating and air conditioning design data
- Supplementary Control System Operating Manual
- Studies in atmospheric effects on artillery ballistic trajectories
- Monthly meteorological newsletters
- Program of Instruction on Meteorology for the Army Artillery Officer's Career Course
- Coauthored Effective Writing Manual

TESTIMONY OF STEVEN H. LAMM, M.D.
ON BEHALF OF
PHELPS-DODGE CORPORATION
BEFORE THE
ENVIRONMENTAL PROTECTION AGENCY

Submitted November 8, 1983

My name is Steven H. Lamm. I am a physician epidemiologist and pediatrician in the private practice of Epidemiology. The name of our group is Consultants in Epidemiology and Occupational Health, Inc., in Washington, D.C. I have served as epidemiologist to numerous national and international governmental agencies. I have been active in developing the field of epidemiologic auditing and in quantitative carcinogenic risk assessment. The results of my scientific risk analyses and critiques have been presented before scientific groups here and abroad and before various U.S. regulatory groups. My experience with health risks specifically associated with arsenic exposure include the examination of 1200 copper smelter workers and the critical analysis of epidemiologic data.

Today I speak at the request of Phelps-Dodge Corporation to present analytic concerns deriving from EPA's assessment of community lung cancer risk from emissions of the Ajo smelter in Ajo, Arizona. I shall limit my comments today to what I perceive to be the thought processes behind the selection of the "higher

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risk" smelter in the proposed standards for inorganic arsenic, the formulas and model used in these calculations of risk, and the data incorporated or omitted from such analyses.

EPA has identified 14 primary U.S. Copper smelters that use feed materials containing less than 0.7% arsenic. The risk analyses for these smelters is found in Appendix E. For each plant, EPA has calculated two parameters of the quantitative estimate of the public cancer risk from inorganic arsenic exposure - the minimum lifetime risk and the aggregate annual cancer incidence.

The first parameter is called by EPA the "maximum lifetime risk" and is the worst case estimate of the risk to the group within the community that has the highest ambient arsenic exposure from the smelter emissions. This parameter is calculated by multiplying the group's average lifetime arsenic exposure by the arsenic unit risk.

There are a number of reasons why these given numbers cannot be deemed valid estimates.

1. The average lifetime arsenic exposures are based on modeling results rather than on measurements. The correct assessment should be based on air measurements both when the smelter is operating and when it is down in order to determine the marginal increased arsenic exposure due to current smelter operations.
2. The background information document presents table E-4 which shows the aggregate distribution of persons around the 14 smelters by predicted level of increased exposure. This table should be presented separately for each plant together with isopleth maps showing the distribution of these predicted levels in the communities.

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3. A very complex system of enumeration districts and block groups are referred to in the development of population numbers, but as the data and maps are not given, they cannot be assessed. Since these maps and isopleths are not available, one cannot assess the accuracy of the estimated "maximum lifetime risk." For instance, in Ajo, the homes closest to the smelter (and presumably the residents of those with the greatest risk) were Phelps-Dodge property leased or rented to employees. Subsequent to the 1970 census upon which EPA's enumeration district 1 block group data were based, the homes were vacated and the land was taken over for an extension of the open pit.
4. The dispersion pattern of the emissions is based on the STAR summary of climatological data for the closest station. In the case of Ajo, the data concerns not the town of Ajo, but the town of Tucson, about 100 miles away on the opposite side of the Comababi, Santa Rosa, Sikortchuao and Tucson mountains and of the Papago Indian Reservation.
5. The average exposure estimate is further dependent on the estimate of total arsenic emissions from the stack and from fugitive sources. I am no expert on meteorological modeling or of industrial emissions estimation. However, I am struck by the complicated methodology, based on disparate data producing predicted exposures that have not been validated. For instance, the model predicts that there is a group of residents with an average lifetime residential exposure of 0.20 ug/m^3 . No data are given indicating how many people have that predicted exposure. The highest average exposure I am able to find documented is 0.08 ug/m^3 . Concurrently, levels far higher are recorded for non-urban environments. Ambient arsenic levels at down time of smelter have not been made yet, so that marginal or incremental exposure levels cannot be calculated. EPA estimates the average incremental exposure in Ajo is 0.057 ug/m^3 . The State of Arizona measures an average total exposure of 0.0153 ug/m^3 .

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The second parameter is called by EPA "cancer incidence per year." This title is misnamed and should be the worst case estimate of the aggregate annual incremental lung cancer mortality for the community. It is obtained by adding up the worst case risk estimate for each geographic area of the population which is obtained by multiplying the estimated incremental arsenic exposure in each geographical area by the number of persons in that geographic area and then by the unit risk worst case estimate. As above, these EPA calculations cannot be audited for no data is given indicating the derivation of these numbers. Nonetheless, there are suggestions in the report that make the numbers suspect.

The emission levels used in the EPA analysis were based on a dispersion model that used meteorologic data from one hundred miles away from the place of concern and on emission predictions that are not accepted by the plant's professionals. EPA's predicted exposure levels have not been validated using actual meteorologic data and community exposure levels in the community.

With respect to population numbers, Table E-3 indicates 9,000 residents exposed to emissions from the Ajo plant. This number is strange since the 1980 census for Ajo was 5,189 and the only other community within 20 kilometers is Why, Arizona with 125 residents, for an estimated total of about 5,300 persons. EPA's estimate is 70% greater. Part of the cause of this overestimation may be methodological. Page E-12 indicates 1970

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data was used and then adjusted by county level growth factors. Ajo is in Pima County, as is the city of Tucson, with 1980 population of 330,537. Between 1970 and 1980, Tucson experienced a growth rate of 26%, while Ajo's census dropped from 5881 to 5189, a drop of 12%.

The unit risk estimate used in Appendix E is based on out-of-date reports and methodology. The unit risk estimate in the June 1983 Health Assessment Document for Inorganic Arsenic is based on selected data from a number of epidemiologic studies. For application to copper smelters, with arsenic trioxide exposure, analysis should be limited to studies of trivalent arsenic only and not incorporate pentavalent arsenic data. Data are available from the studies of Anaconda, Montana and Tacoma, Washington copper smelter employees.

The Anaconda workers have been studied by Anna Lee and by Professor Higgins of Michigan. The Lee-Feldstein data does not fit the linear-no threshold model and only fits it inadequately ($p < .05$) when the heavy exposure group is removed from the analysis. The Brown-Chu analysis uses out of date data and analyzes only workers employed past age 55. Both the Lee-Feldstein and the Brown and Chu analyses use an inappropriate exposure classification and thus are inappropriate bases for quantitative risk analysis. Higgins uses an appropriate exposure classification scheme where exposure groups do not overlap. The differences between these classification schemes is seen in Figures I and II. He demonstrates excess lung cancer risk only

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among those workers with exposures over 500 ug/m³. We have interpreted this as epidemiologic support of a possible threshold. The original Higgins' study was based on a stratified sample with 100% sampling of some groups and 20% sampling of others. EPA's analysis ignores this study design as it ignores the stratified analysis.

The Tacoma, Washington workers have been studied by Professor Enterline of Pittsburgh. His data, based on urinary arsenic levels, indicates an excess relative risk among the smelter workers that is rather independent of cumulative arsenic levels. EPA connects urine arsenic levels into air arsenic levels using a correlation that gives an inadequate fit and is thus unusable. EPA further finds a significant slope to this data only by assuming that arsenic exposure at this plant is the only lung cancer risk these workers have been exposed to, ignoring other possible occupational carcinogenic exposures. EPA's most recent health assessment uses the absolute risk, analyzing a method that underaccounts for the age related incidence of lung cancer.

The unit risk estimate is poorly described in these documents. There is no indication that it is a worst case estimate, rather than a most likely estimate. EPA in Appendix E to the background information document defines the unit risk estimate for a air pollutant as "the lifetime cancer risk occurring in a hypothetical population in which all individuals are exposed continuously from birth throughout their lifetimes

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(about 70 years) to a concentration of 1 ug/m^3 of the agent in the air they breath." The risk assessment and the standard should include at least the definition of the unit risk accepted by Dr. Roy Albert at the last SAB meeting: The unit risk estimate is the maximum lifetime increased risk of cancer that could theoretically be estimated to occur in a population of individuals who are exposed continuously from birth throughout their lifetimes to a concentration of 1 ug/m^3 of the agent in the air they breath."

Thus, we find the three factors entering the risk analysis to be wanting. Two are based on data from the city of Tucson (a hundred miles away) and overpredict exposure levels by probably a factor of three or more and total population by 70%. The third is based on a worst case assumption using a restricted model of limited fit. Before EPA promulgates a standard, these factors should be corrected.

Having discussed the factors that went into EPA's risk assessment and the data utilized by EPA in its derivation, I would now like to turn to the area of Risk Management. Using the numbers that EPA has developed, what are the decision processes or policies upon which EPA has selected which smelters should have additional controls required?

EPA makes use of the above parameters in order to develop its higher risk classification scheme. A table is given on page 33147 in the Federal Register notice of the proposed standard that presents EPA's classification scheme. Table 1 (attached)

places each plant on to this table and identifies whether by EPA criteria and calculations it is thus classified as a smelter of higher or lower risk. The analytic methodology is not evident. EPA further states that the possible cut-off lines "are not the product of any particular analytic methodology although they appear to provide defensible results when applied to low arsenic feed smelters."

Table 2 presents the same data seen in Table 1 but lists smelters by EPA's aggregate worst case estimates of mortality in decreasing order. The maximum individual lifetime risk as calculated by EPA is also given, as is the EPA assignment into the category of either higher or lower risk smelter. The final column presents the maximum predicted case frequency in seventy years (or one generation) for each plant based on EPA's calculation. It is obtained by multiplying the EPA's predicted annual risk (column 2) by seventy years. It can be noted that there appears to be a direct correspondence between EPA's classification of a higher risk smelter and EPA's calculation of a maximum community lifetime risk of a single case. It thus appears that EPA's regulatory determination is based on a policy decision that "unacceptable risk" exists when the worst case estimate of the aggregate incremental cancer risk in the community from a plant exceeds one case per generation (or lifetime of 70 years) (providing that some group has a maximum lifetime risk of greater than 10^{-4}).

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This proposal appears to contain an unannounced policy definition of acceptable risk for environmental exposure and to propose regulations based on that policy.

I shall not consider here today whether that policy is wise, just, or appropriate, but consider the risk assessment of the Ajo plant in light of this policy position.

The maximum individual lifetime risk estimated for Ajo residents is just somewhat above the EPA policy cut-off of 10^{-4} and is less than that of these smelters in the lower risk category. Reassessment of the data will indicate a lower unit risk estimate, and lower exposure prediction and may show that no one lives now in the areas EPA considers to have a lifetime risk of greater than 10^{-4} .

The predicted annual cancer incidence estimate for Ajo will reduce as the unit risk estimate, emissions estimates and dispersions or exposure measurements, and the population figures are refined. A rough approximation using EPA methodologies would be a $1/3$ reduction in the unit risk estimate, a 35-65% reduction in exposure estimates (let's assume 50%), and a 45% reduction in population estimates. Together, these refinements are predicted to yield a maximum predicted annual incremental cancer incidence (or mortality) of $(2.1 \times 10^{-2} \times 2/3 \times 1/2 \times .55 = 3.9 \times 10^{-3})$ or a maximum predicted community lifetime frequency of 0.27 cases,

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well within the "acceptable risk" level presented in this EPA schema and appropriate for Ajo's classification as a "lower risk" smelter.

Thank you.

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Table 1*

Maximum Individual Lifetime Risk Greater Than	Expected Annual Cancer Incidence Greater Than	Higher Risk Smelter	Lower Risk Smelter
10 ⁻¹	0.0014	---	---
10 ⁻²	0.0014	McGill	---
10 ⁻³	0.0140	Hayden (Asarco) El Paso Inspiration	White Pine Douglas Hayden (Kennecott)
10 ⁻⁴	0.0140	Ajo	Morenci Tennessee Hurley Magma
10 ⁻⁵	0.1400		
10 ⁻⁶	1.4000		Garfield Hidalgo

This table presents EPA's classification schema [Fed. Reg. 33147 (1983)]. Assignments are based on EPA predictions which have not been independently verified.

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Table II

<u>Smelter Location</u>	<u>Predicted* Annual Cancer Incidence</u>	<u>Maximum* Individual Lifetime Risk</u>	<u>EPA Classification</u>	<u>Maximum Predicted Case Frequency per 70 years</u>
El Paso	2.8×10^{-1}	4.5×10^{-3}	Higher	19.60
McGill	2.5×10^{-2}	1.7×10^{-2}	Higher	1.75
Hayden(A)	2.4×10^{-2}	9.0×10^{-3}	Higher	1.68
Ajo	2.1×10^{-2}	6.1×10^{-4}	Higher	1.47
Inspiration	1.5×10^{-2}	1.9×10^{-3}	Higher	1.05
Douglas	1.2×10^{-2}	3.8×10^{-3}	Lower	0.84
Hayden(K)	6.5×10^{-3}	1.7×10^{-3}	Lower	0.46
Morenci	3.1×10^{-3}	6.0×10^{-4}	Lower	0.22
Garfield	2.5×10^{-3}	6.5×10^{-6}	Lower	0.18
Magma	1.5×10^{-3}	1.4×10^{-4}	Lower	0.11
Tennessee	1.4×10^{-3}	2.8×10^{-4}	Lower	0.10
Hurley	4.8×10^{-4}	1.6×10^{-4}	Lower	0.03
White Pine	1.7×10^{-4}	6.0×10^{-3}	Lower	0.01
Hidalgo	2.1×10^{-5}	5.5×10^{-6}	Lower	0.00

*These numbers have been obtained from EPA's Table E.5. and have not been independently verified.

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Figure I

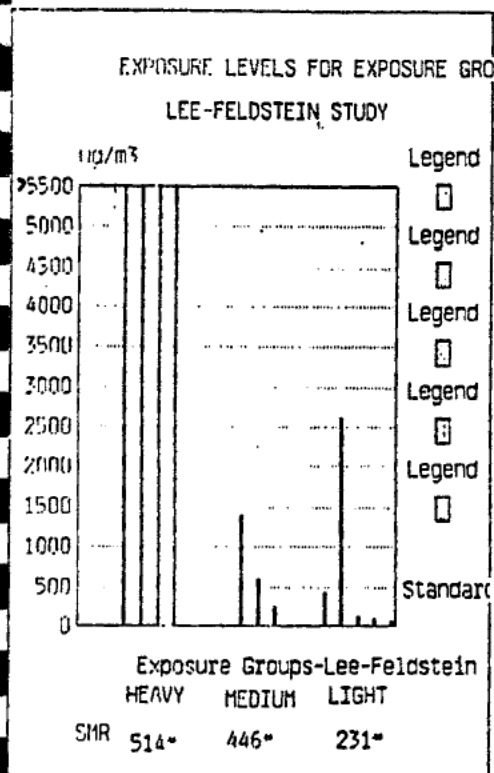
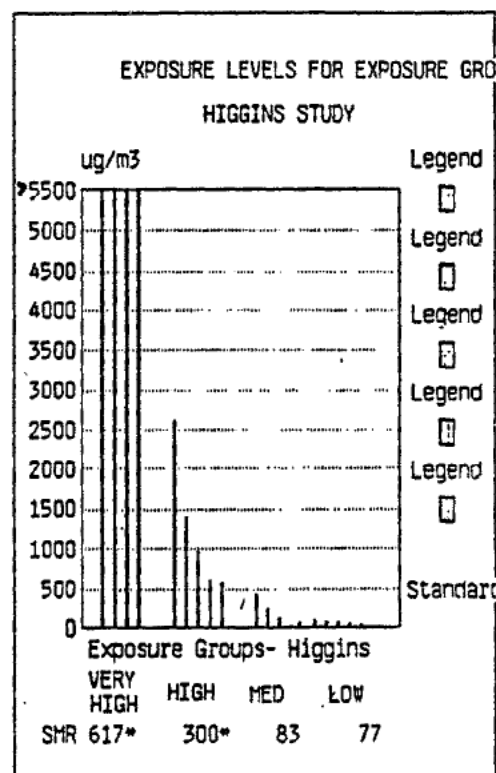


Figure II



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CURRICULUM VITAE

STEVEN H. LAMM, M.D., DTPH

President
Consultants in Epidemiology
& Occupational Health, Inc.
(b) (6)
Washington, D.C. 20007
(b) (6) (b) (6)

EDUCATION:

London School of Hygiene and Tropical Medicine
London, England (b) (6) ; DTPH (Diploma in Tropical
Public Health)

University of Southern California
School of Medicine (b) (6) ; M.D. (Medical Doctorate)

University of Southern California
Graduate School (b) (6) M.S. (Biophysics)
Nerve Action Potential Conduction

University of California, Los Angeles
(b) (6) ; B.S. (Chemistry) Radiation Chemistry

Reed College, Portland, Oregon (b) (6)

Fairfax High School, Los Angeles, California

PROFESSIONAL AWARDS:

American Academy of Occupational Medicine,
Member (b) (6)

American Conference of Governmental Industrial
Hygienists, (b) (6)

American Board of Preventive Medicine,
in Occupational Medicine, (b) (6)
in Preventive Medicine, (b) (6)

American College of Epidemiology, Charter Fellow
(b) (6)

American Industrial Hygiene Association,
Occupational Medicine Committee, (b) (6)
Epidemiology Committee, (b) (6)

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American Industrial Hygiene Association Journal,
Editorial Review Board, (b) (6)

American Occupational Medicine Association, Member
(b) (6)

American Academy of Pediatrics, Fellow (b) (6)

American Board of Pediatrics, (b) (6)

Royal Society of Tropical Medicine, Fellow (b) (6)

Annual Prize of the Society for Epidemiologic
Research, May (b) (6)

PROFESSIONAL ACTIVITIES:

Past Secretary-Treasurer, Society for
Epidemiologic Research
(b) (6)
Washington, D.C. 20007

Clinical Assistant Professor of Pediatrics
Georgetown University Medical School
Washington, D.C. 20005

Adjunct Assistant Professor of Preventive Medicine
and Biometrics
Uniformed Services University
of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814

PROFESSIONAL EMPLOYMENT:

(b) (6) Occupational Physician and Epidemiologist
Chief Executive Officer
Professional Consultants in Occupational
Health, Inc.
7720 Wisconsin Avenue, Suite 205
Bethesda, Maryland

ADMINISTRATIVE REMOVAL

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- (b) (6) Occupational Physician and Epidemiologist
Tabershaw Occupational Medicine Associates
6110 Executive Boulevard, Suite 740
Rockville, Maryland
- (b) (6) Private Practice of Pediatrics
Pleasant Hill, California
- (b) (6) Senior Epidemiologist
Epidemiology Branch, National Institute of Child
Health and Human Development
National Institute of Health
Bethesda, Maryland
- (b) (6) Lecturer in International Health and
Consultant in Family Planning
Development Administrators
Training Program
University of Connecticut
Hartford, Connecticut
- (b) (6) Medical Director, Middletown Free Clinic
Middletown, Connecticut
- (b) (6) Epidemic Intelligence Service
Officer from the Center for Disease Control
Atlanta, Georgia
Attached to the Connecticut State Department
of Health, Department of Preventable Diseases,
and the Connecticut State Tumor Registry

PUBLIC CONSULTING ACTIVITIES:

- (b) (6) Consultant in Birth Defect Epidemiology, National
Center for Health Statistics
- Chairman, Symposia on Bioethics in International
Health, APHA, Chicago
- Participant and Speaker, Population Tribune, World
Population Conference, Bucharest, Rumania
- USAID Consultant in Family Planning Training, for
Korea, Thailand, Bangladesh, and Pakistan
- Vaccine Morbidity Studies in Amazonian Indians,
Yale-PAHO

(b)
(6)

Short-Term Consultant on Cholera to the Phillipines
World Health Organization

WHO/USPHS Smallpox Eradication Program, Kaduana,
Nigeria

RESIDENCY - PEDIATRICS:

(b) (6)

Albert Einstein College of Medicine, New York, New York
Special Project: Lead in Infant Formulas

Montreal Children's Hospital, Montreal, Quebec, Canada
Special Project: Electronmicroscopy of Heart Muscle

INTERNSHIP - ROTATING:

(b) (6)

University of Oregon Medical School Hospital and
Associated Clinics

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November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF MICHAEL O. VARNER

My name is Michael O. Varner. I am Corporate Director of the Department of Environmental Sciences for ASARCO Incorporated. With me today on behalf of ASARCO are Mr. Guptill, who is the Director of Environmental Affairs for ASARCO's Hayden plant, Mr. Counts and Mr. Holt, who are with the Company's Central Engineering Department, Mr. Lindquist, who is Manager of the Tacoma smelter, and Mr. Robbins, who is Supervisor of Environmental Sciences in the Department of Environmental Sciences.

I will summarize ASARCO's position with regard to the proposed standards governing arsenic emissions from the "low arsenic" copper smelters and give an overview of the testimony that you will hear today. ASARCO has, of course, already presented extensive evidence at the hearing last week in Tacoma, Washington, as to the issues specific to the "high arsenic" copper smelter, ASARCO's Tacoma smelter. We shall not repeat that evidence in this hearing, but we do incorporate it by reference insofar as it relates as well to the low arsenic smelters. One area where it does relate is the matter of risks to the public health. ASARCO has presented extensive evidence showing that emissions of inorganic arsenic from the Tacoma smelter do not represent a threat to the public health. Since emissions from the Tacoma smelter do not

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endanger the public health, then all the more clearly emissions of inorganic arsenic from the lower arsenic smelters do not endanger the public health.

The proposed standards would, among other things, require that (1) ASARCO install air curtain secondary hoods on the converters at its El Paso and Hayden smelters and (2) collect particulate in gases captured in matte and slag tapping ventilation at those plants. ASARCO does not oppose the matte and slag tapping ventilation requirement; it is either already doing this or is committed to doing it. ASARCO does, however, oppose the requirement that it install air curtain secondary hoods at those two smelters. Alone among the low arsenic smelters, these two plants had previously installed controls -- then thought to be the best available -- for the capture and collection of fugitive emissions of particulate from their converters. It should not be penalized for being first to install controls. These existing controls should be considered best available technology (BAT) for these two smelters.

In particular, ASARCO strongly opposes any requirement that would force it to rip out its existing secondary hoods at Hayden, which were installed less than four years ago at a cost of \$4.4 million, and to replace them with air curtain hoods. In support of this opposition, ASARCO's witnesses shall first show that EPA has overestimated the baseline emissions of arsenic due to fugitive converter emissions at Hayden by at least a factor of 10. Mr. Guptill will point out errors in the arsenic distribution chart for the Hayden plant contained in the Background Information Document. Correcting these errors substantially decreases the average rate of arsenic emissions in converter offgases. Mr. Counts will show that EPA has overestimated potential converter fugitive emissions at Hayden by failing to take into account the much greater draft under which the primary converter hoods will be operated at

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that plant when the new Inco smelting furnace commences operation. Mr. Holt will show that EPA has underestimated the costs of installing air curtain secondary hoods at Hayden. Accurate annualized cost estimates are three times as high as EPA's. He will also point out that air curtain hoods will be significantly less efficient than the prototype hood at Tacoma because their dimensions cannot be as large. Consequently, air curtain secondary hoods will, at best, achieve only a minimal reduction in arsenic emissions at Hayden at a great cost.

With regard to El Paso, converter fugitive emissions of arsenic are controlled through enclosure and evacuation of the converter building. EPA in the BID states that this system is only 75% efficient. Mr. Counts points out in his prepared statement that this system should be credited with higher efficiency because certain roof ventilators that were previously kept open have been sealed shut. In addition, a new computerized damper system has reduced potential converter fugitives. Mr. Holt shows in his prepared testimony that EPA has underestimated the costs of controls at El Paso.

ASARCO is willing, however, to consider installing air curtain secondary hoods at El Paso. Such hoods would not only reduce fugitive emissions, they would also improve workplace conditions and help meet OSHA requirements. ASARCO recently told the Texas Air Control Board that it would not oppose installation of such hoods if there is reasonable coordination among the regulations imposed by various agencies. Such coordination requires first that EPA make final its general design criteria for secondary hoods. In view of the fact that air curtain secondary hoods will lead to the increased capture and measurement of fugitive emissions of SO_2 from the converters, reasonable coordination also requires that the State revise the SO_2 and

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opacity limitations on emission points that would be affected by the installation of secondary hoods.

Apart from these comments specific to El Paso and Hayden, ASARCO has objections to portions of the proposal applicable to all three of its copper smelters. First, Mr. Lindquist will explain that the proposed work practice requirements, such as that a ladle be held off the ground during slag skimming, would significantly decrease productivity and increase safety hazards. Such work practice requirements should be deleted from the final standard. Mr. Counts in his prepared statement shows that there is insufficient support for the proposed emission standard of 11.6 mg/dscm. The NSPS standard of 50 mg/dscm should be used instead. Mr. Robbins in his testimony shows that EPA should not rely on transmissometers to monitor compliance and that it should allow alternative methods for analyzing arsenic. Finally, Mr. Guptill's prepared statement points out that EPA's estimates of airborne arsenic concentrations in its risk assessments are based on air quality modeling using incorrect input data.

We have one general objection to EPA's regulatory approach. In its proposal, EPA considers the cost-effectiveness of the proposed requirements. ASARCO in general agrees with this approach. Certainly the cost-effectiveness of the requirements, including the work practice requirements, should be taken into account. In one respect, however, EPA's method of analyzing for cost-effectiveness is prejudiced against ASARCO. ASARCO is the only copper company that is presently capturing fugitive converter emissions, arsenic-bearing particulates, and other particulates in a manner consistent with EPA's proposed best available technology approach. Because ASARCO already has these controls in place and because EPA assumes that ASARCO would use some of the existing

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equipment to meet the proposed standard, EPA's estimates of the incremental costs of the proposal for ASARCO are substantially lower than its estimates of the costs for other companies */

As a result, EPA's cost-effectiveness analysis makes the proposal appear more costly to those who have done the least previously and thus rewards those who have postponed installing controls. This approach accords neither with sound environmental policy in that it encourages delay in installing controls nor with the policy of encouraging regulatory stability. To correct for this problem to some extent, estimates should take into account all direct operating and maintenance costs for air curtain secondary hoods. Beyond that, however, these policies require that ASARCO should not be required to undertake more than what it is doing now unless it would serve a substantial purpose. Our witnesses will show that requiring air curtain secondary hoods at Hayden would not serve such a purpose. Such hoods would reduce arsenic emissions by only a very small amount, and would be very costly. In view of the fact that baseline emissions of arsenic from converter fugitive emissions at Hayden will be lower than or about the same as emissions from other smelters where EPA would not require any controls, these policies compel the conclusion that air curtain secondary hoods should not be required at Hayden.

*/ In certain respects, EPA underestimates ASARCO's incremental costs. EPA assumes, for example, that ASARCO will have no additional maintenance costs at El Paso from running air curtain hoods. In fact, ASARCO would be running both the hoods and the building evacuation system, so there would be increased costs. Similarly, EPA assumes no maintenance costs at Hayden even though air curtain hoods would be more costly to maintain than the existing secondary hoods. Moreover, EPA's incremental costs do not include the costs of removing the existing secondary hoods at Hayden.

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November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF C.K. GUPTILL

My name is C.K. Guptill. I am Director of Environmental Affairs for the Hayden plant of ASARCO Incorporated. I have held this position since 1978. From 1973 to 1978, I was Senior Meteorologist at the Hayden plant. Previously, I worked at ASARCO's El Paso plant as a meteorologist. I have a Bachelor of Science degree in meteorology from the University of Utah and am a Certified Consulting Meteorologist.

I will address two points in my statement. First, the estimated arsenic distribution in EPA's Background Information Document (BID) requires correction. In particular, EPA's estimate that converter offgases will contain 99 lb/hr of arsenic is too high. The estimate should be 70 lb/hr. Reduced arsenic in converter offgases, of course, means lower potential fugitive emissions of arsenic from the converters. Second, I will show that the air quality dispersion modeling underlying the risk assessments in the BID uses incorrect input data and generally is not reliable.

A. Corrected Arsenic Distribution for the Hayden Plant

As EPA knows, ASARCO is in the process of starting up a new smelting furnace at the Hayden plant. The existing multihearth roasters and reverberatory furnaces are being replaced with an oxygen-fueled Inco flash furnace.

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Attached to this statement is the arsenic distribution chart that we have prepared based on ASARCO's current estimate of the Hayden smelter's likely arsenic input and on percentage distribution estimates derived from pilot plant studies and computerized model simulations performed for ASARCO by Inco Tech.^{*/} The principal differences between that chart and the EPA chart are as follows:

1. Instead of an arsenic input from concentrate and lead smelter byproducts of 375 lbs/hr, the corrected input is 583 lbs/hr. This input is based on an intake of 1606.5 tons of concentrate per day, 20.0 tons of matte per day, and 35.0 tons of speiss per day. Most of the arsenic in this total comes from the speiss, a lead smelter byproduct that is 18% arsenic. This arsenic input represents ASARCO's current estimate of what will be smelted at the Hayden plant in the future.

2. According to Inco's tests and estimates, approximately 78% of the total arsenic intake will be volatilized in the Inco flash furnace at Hayden, and about 8% will report to the slag. This is fully consistent with the flash furnace data presented in EPA's background document. It reports arsenic volatilization of from 76% to 85% in various flash furnaces, with 7% to 17% of the arsenic being slagged off. BID, p. 2-28.

Instead of using these data to estimate the arsenic distribution at Hayden, EPA relied on Kennecott's estimate that only 50% of the arsenic input

^{*/} The pounds per hour rates in the various process streams do not always add up exactly to the same figure. The reason for this is that the Inco Tech estimates are given in terms of percentages of arsenic in various materials. The imprecision in rounding off the percentages of arsenic in materials weighing hundreds of tons leads to small discrepancies in the pounds per hour rates.

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at its Hurley, New Mexico, smelter would be volatilized in its flash furnace. Use of the Hurley estimate at Hayden is unsupportable. Hurley has almost no arsenic in its feed. As EPA has recognized, the higher the arsenic intake the greater the percentage of arsenic volatilized in a smelting furnace. BID, p. 2-25.

3. Finally, the EPA chart shows the smelting furnace offgas going to a separate ESP, with the captured dust being recycled to the smelting furnace. This is not entirely correct. In fact, the Inco furnace offgas will report to a settling chamber. Any dust collected there will be recycled. But the offgases will then proceed from the settling chamber and be mixed with converter offgases. Any dust collected from these combined gas streams will be sent elsewhere for further treatment.

As a result of these corrections, while total arsenic intake is greater, the amount of arsenic reporting to the converters is 139.8 lb/hr, not 214 lb/hr, and the arsenic content of the converter offgas is 70 lb/hr, not 99 lb/hr.

B. EPA's Air Quality Modeling

In the preamble to the proposed emission standards and in the low arsenic smelter BID, EPA sets forth the result of its quantitative risk assessments for arsenic. In the hearings that were held in Tacoma, ASARCO presented evidence as to why use of a linear no-threshold model to estimate unit risk from exposure to arsenic is inappropriate. In addition to this deficiency, the air quality dispersion modeling that underlies the risk assessments at Hayden and El Paso does not produce reliable estimates of airborne arsenic concentrations.

To begin with, the modeling for Hayden uses incorrect input data. The modeling of baseline emissions from ASARCO's Hayden plant is supposed to take into account the installation of the Inco furnace. The data input listed on page E-16 of the BID models emissions from Hayden assuming that there is one 61 meter stack, one 30.5 meter stack, and a vent with an elevation of 30.5 meters. In fact, in its new configuration all process gases and captured fugitive emissions will be treated and then sent to a 305 meter (1,000 foot) stack. The tail gases from the acid plants will be emitted from the inner stack, which has an area of 227 square feet, while the remaining gases will be released through the outer portion which has an area of 377 square feet. The plume gases will be emitted at a velocity of approximately 26 feet per second. The EPA model incorrectly uses exit velocities of 7, 3, and 22 feet per second. Finally, as shown in the testimony of Mr. Counts, the model greatly overestimates the amount of fugitive emissions that will be emitted by the new smelter under baseline conditions.

Another problem with EPA's modeling, as EPA concedes at p. E-26 of the BID, is that it uses meteorological data which are not specific to the individual plant sites. Instead, EPA used STAR data from the nearest weather service station. In the case of a smelter like Hayden, for instance, the nearest STAR site is Tucson, which is about 100 kilometers away and which has quite different terrain. Tucson is in a broad plain-type valley, while the terrain at Hayden is mountainous with a narrow valley. Moreover, the smelter at El Paso is on the other side of mountain terrain from the airport in a narrow valley that was cut by the flow of the Rio Grande, so that airport meteorological data are not representative for the smelter. Smelters operating supplemental control systems should have available meteorological

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data sufficient for any modeling that would be more representative of smelter sites. Even use of plant site meteorological data would not be representative of wind speed and duration at the top of a tall stack. I have observed plumes from the Kennecott-Ray 200 meter stack going in a direction 180° opposite to plumes from the ASARCO 305 meter stack.

A further problem with the modeling is that a flat terrain model is used for areas that are anything but flat. The BID, p. E-26, states that this means that EPA's modeling underestimates concentrations in areas with terrain. But this is not necessarily so. Moreover, the mean concentration at the Hayden fire station (a site that is in the town's population center), as measured by an ASARCO low-volume monitor, for the four quarters of 1982 and the first quarter of 1983 is 0.14 ug/m^3 . The EPA estimate at that site, derived from interpolating its modeling estimates, is about 0.417 ug/m^3 . That is, the EPA estimate is about three times too high. High-volume samplers may record higher concentrations than low-vol samplers, particularly at close-in sites. Preliminary data from lead monitors at El Paso suggest that multiplying a low-vol reading by 1.67 yields an approximation of a corresponding hi-vol reading at close-in sites. Doing this, the adjusted low-vol mean at the Hayden fire station is still 0.234 ug/m^3 , about half of the EPA modeling estimate.

But even this comparison does not fully reflect the extent to which EPA's modeling overestimates airborne concentrations at Hayden. First, the recorded ambient concentrations are from a period when ASARCO was operating in the old smelter configuration. Emissions of arsenic will be much less when the Inco smelting furnace is in operation, and EPA is supposed to be modeling for the Inco configuration. Second, the modeling estimates are only for ASARCO's Hayden smelter, and we have not attempted to add to these estimates

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the EPA modeling estimates for Kennecott's Hayden smelter. Any arsenic in the ambient air, of course, is the result of emissions from both smelters.

In sum, the air quality modeling on which the EPA risk assessments are based furnishes an inadequate basis for placing regulatory burdens on the copper smelting industry.

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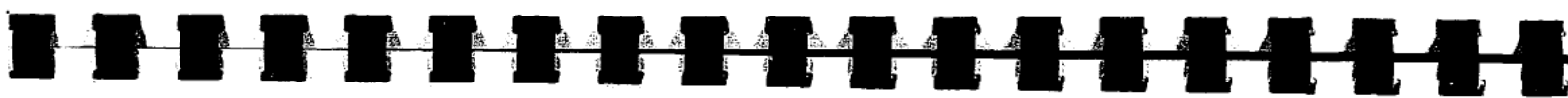
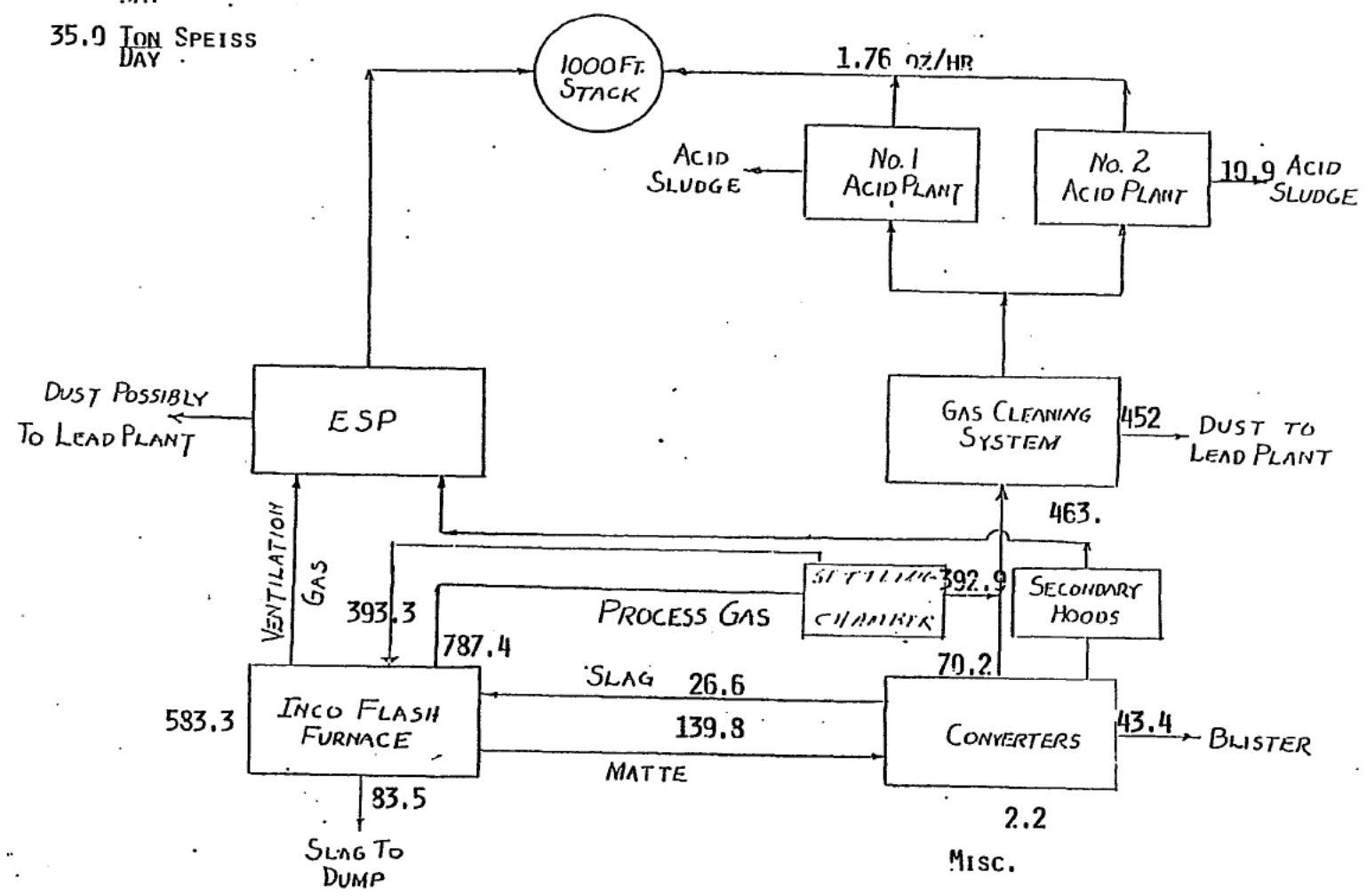
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20.9 TON MATTE
 DAY
 35.0 TON SPEISS
 DAY

GAS DISTRIBUTION



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	<u>DSTPOD</u>	<u>% ARSENIC</u>	<u>lb/hr ARSENIC</u>
Furnace Input			
Slag	307.3	.1037	26.6
Concentrate	1661.5	.4213	583.3
Recycled	63.1	7.4789	393.3
			<u>1003.2</u>
Furnace Output			
Slag	1221.5	.082	83.5
Matte	818.6	.205	139.8
Dust	75.1	12.5823	787.4
			<u>1010.7</u>
Converter Input			
Matte	818.6	.205	139.8
Miscellaneous	9.0	.2881	2.2
			<u>142.0</u>
Converter Output			
Slag	307.3	.1037	26.6
Blister	453.2	.1148	43.4
Dust	11.6	7.264	70.2
			<u>138.2</u>

Based on 1606.5 ton/day concentrate, 20 ton/day matte and 35 ton/day speiss.

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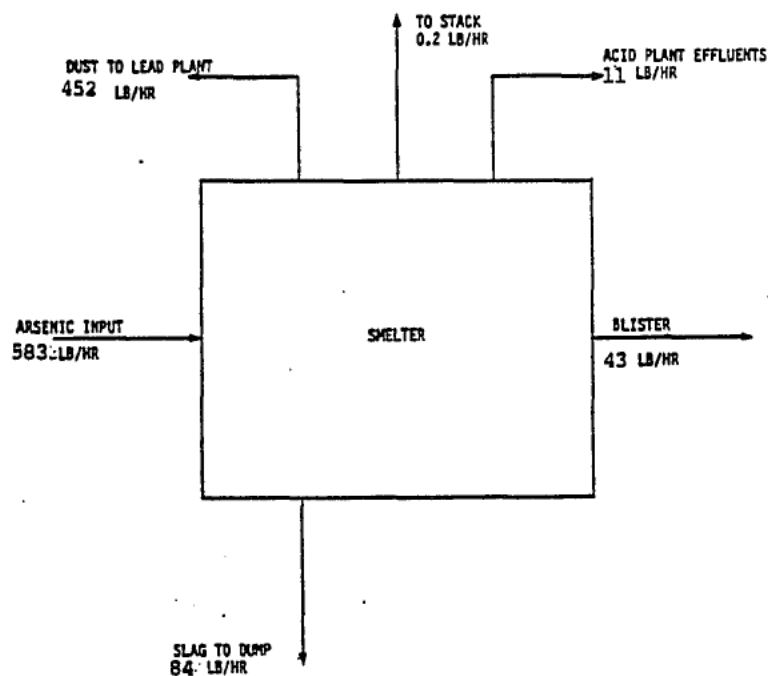


Figure F-2(b). Overall Arsenic Material Balance at ASARCO-Hayden Smelter

November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF CHARLES R. COUNTS

My name is Charles R. Counts. I am Assistant Manager of the Fume Recovery Section in the Central Engineering Department of ASARCO Incorporated. My curriculum vitae is attached.

This statement will have three parts. In the first part, I will show that EPA has overestimated by at least a factor of 10 baseline fugitive emissions of arsenic from the converters at ASARCO's Hayden smelter. The principal reason why this is so is that EPA did not take account of differences between smelters in how they operate the draft on the primary converter hoods. EPA's estimate of potential converter fugitives is based on testing at a smelter where primary hood draft is kept low to avoid dilution of offgases going to an acid plant. When the Inco furnace commences operation at Hayden, the draft on the primary hoods will be increased in order to dilute offgases before they reach the acid plants. The higher the primary hood draft, the lower the fugitive emissions.

In the second part, I will show briefly that EPA has overestimated baseline emissions at El Paso. EPA credits the building evacuation system with only 75% efficiency because certain roof ventilators were open in the past. Those ventilators have been sealed shut. Current estimates of the

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system's efficiency range from 85% to over 90%. In addition, potential fugitive emissions from the converters have been significantly reduced by a new computerized damper system.

Finally, I will show that there is inadequate support for the proposed emission standard of 11.6 milligrams of total particulate per dry standard cubic meter, or 0.005 grains per dry standard cubic foot. In lieu of this unsupported limit, EPA should adopt the applicable NSPS limit of 50 mg/dscm or 0.022 gr/dscf.

A. Estimating Baseline Converter Fugitive Emissions at Hayden

All of EPA's estimates of potential converter fugitive emissions are based on an emission factor of 15%: that potential fugitive emissions of arsenic from the converters equal 15% of the arsenic measured in converter process offgases. This emission factor was based on tests done at the converter building baghouse in 1978 at ASARCO's El Paso smelter in which all the arsenic measured at the inlet of the baghouse was attributed to converter fugitive emissions. BID, p. 2-53. There is good reason to doubt the accuracy of this attribution, because there are other sources of arsenic within the converter building. In any event, even if the 15% emission factor may be a reasonable approximation of potential converter fugitive emissions at smelters that operate their converters in a fashion similar to the way those at El Paso were operated in 1978, use of that emission factor is very unreasonable at the modernized Hayden smelter.

The El Paso and Hayden smelters formerly operated their converters very similarly, with the primary converter hood draft kept relatively low in order to minimize dilution of SO₂ gas strength in offgases going from the con-

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verters to the acid plant. This low primary hood draft was necessary to allow for efficient, autothermic operation of the acid plant. But this low primary hood draft meant that visible emissions could be seen escaping from the primary hood during the blowing portion of the converter cycle.

The operation of the converters at the Hayden smelter will change dramatically once the Inco flash furnace commences operation. The offgases from that furnace, which will be approximately 80% SO₂, will be blended with converter gas ahead of the electrostatic precipitator and the acid plants. Because the No. 1 acid plant is designed to process gases that are a maximum of 6.5% SO₂ and the No. 2 plant to process gases that are a maximum of 12.0% SO₂, additional air is needed to dilute the combined Inco furnace and converter gas streams at some point ahead of the acid plants. ASARCO's intention is to increase the draft on the primary converter hoods to supply a portion of this dilution air. This is far different from the past situation where the draft on the primary hoods was reduced to prevent dilution of the SO₂ in converter offgases. The increased draft will result in a great reduction in the amount of fugitive emissions that escape the primary converter hoods and are thus available for capture by secondary hoods.

One may fairly estimate the potential fugitive emissions from the converters at the modernized Hayden plant by examining the results of sampling at ASARCO's Tacoma smelter, which operates its primary hoods under high draft to minimize low-level emissions, although probably not as high a draft as will be used at Hayden. These data can be looked at from different perspectives, but each shows that secondary emissions from the converters are drastically reduced when the primary hoods are operated under a high draft.

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In January 1983, PEDCo Environmental conducted sampling on the Tacoma air curtain secondary hood for EPA. PEDCo found that the Tacoma secondary hood, which was approximately 95% efficient, captured an average of 11.6 lb/hr of particulate matter during a complete converter cycle. Plant records indicate that approximately 600 pounds of particulate per converter hour are captured by the primary hoods at Tacoma. The average secondary hood capture is thus 2% of the amount of total particulate captured by the primary hood. This 2% factor -- instead of the 15% factor used by EPA -- should be used to estimate converter fugitive emissions at a smelter that operates its primary converter hoods under a high draft. The revised arsenic distribution for ASARCO's Hayden smelter, presented by Mr. Guptill, estimated that there would be some 70 lb/hr of arsenic content in the converter offgas. Applying the 2% figure yields an estimate of potential converter fugitive emissions of 1.4 lb/hr or 0.6 kg/hr. This is far less than EPA's estimate of approximately 15 lb/hr or 6.8 kg/hr (BID, p. 4-14).

The PEDCo data not only show that fugitive emissions are drastically reduced when the primary hood is operated under high draft, they show why -- fugitive emissions are virtually eliminated during the blowing portion of the converter cycle. PEDCo samples taken during all operating modes of a complete converter cycle (which lasts several hours) found that the secondary hood captured an average of 101.4 lbs of particulate for a cycle. Two other samples taken only during the turn in, turn out, charging and skimming portions of the converter cycle averaged 123 lbs of particulate, which, given sampling imprecision, is essentially the same as the results for the complete converter cycle. These results confirm visual observations of the primary hoods at

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Tacoma showing that there are virtually no fugitive emissions during the blowing part of the converter cycle, which is of course by far the longest part.

Interestingly enough, the PEDCo data on the total particulate collected during a converter cycle provide independent support for the estimate that approximately 0.6 kg/hr of arsenic will escape the primary hoods at the Hayden smelter. PEDCo found that the secondary hood at Tacoma captured an average of 101 pounds of particulate during a complete converter cycle. PEDCo and EPA also estimate the efficiency of the secondary hood at Tacoma as 95%. Thus, the potential fugitive emissions of a particulate for a converter cycle would be 106 pounds per cycle ($101 \div 0.95 = 106.3$).

The total particulate per converter cycle that escapes the primary hoods at Tacoma is a fair measure of the total particulate per converter cycle that will escape the primary hoods at the modernized Hayden smelter because those hoods will be operated similarly to the Tacoma primary hoods. If anything, the Tacoma figure of total particulate escaping from the primary hoods would be a high side estimate for Hayden. At Hayden the matte grade from the Inco furnace will be higher than the matte grade at Tacoma, which means that less matte will be charged at Hayden to make a complete converter charge. This will lead to fewer ladles of slag being skimmed, fewer converter turns in and turns out, and a shorter converter cycle at Hayden than at Tacoma.

It is planned that there will be seven converter cycles per day at Hayden. Thus, the total particulate emissions that would escape the primary hoods per day may be estimated as 742 pounds (7×106). In 1980, the particulate captured in the secondary hoods at Hayden was sampled and its arsenic content averaged 5%. The actual percentage arsenic content in the converter particulate in the Inco smelter configuration will probably be somewhat less,

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but using the 5% figure leads to an estimate that there will be 37.1 pounds of arsenic per day in potential fugitive emissions from the converters at Hayden. This translates into 16.9 kg/day of potential emissions or 0.7 kg/hr.

Accordingly, two different routes have led to similar estimates of potential converter fugitive emissions of arsenic at Hayden, 0.6 kg/hr or 0.7 kg/hr. Of course, the Hayden smelter already has fixed secondary hoods to capture these fugitive emissions and vent them to an electrostatic precipitator.

EPA estimates that these existing secondary hoods have a 50% capture efficiency. BID, p. 4-18. Even if one assumes that EPA is correct in attributing 50% efficiency to these hoods, baseline emissions are nevertheless very low. If potential fugitive emissions are 0.7 kg/hr, then fugitive emissions will be $0.7 \text{ kg/hr} \times 50\% \text{ efficient secondary hoods} = 0.35 \text{ kg/hr}$. These low baseline fugitive emissions are about one-tenth of what EPA estimates for Hayden and lower than or close to the estimated baseline emissions for other smelters not required by the proposal to install air curtain secondary hoods. BID, Table 4-5. In fact, ASARCO believes that the existing hoods will achieve 75 to 80% capture efficiency in the modernized smelter. Thus realistic baseline converter fugitive emissions of arsenic at the modernized Hayden smelter are approximately 0.14 to 0.17 kg/hr. These emissions are well within the range of emissions at smelters EPA considers to have best available technology. Hayden should be accorded similar treatment.

B. Estimating Baseline Converter Fugitive Emissions at El Paso

EPA has also overestimated baseline fugitive emissions of arsenic from the converters at El Paso. EPA's estimate is based on (1) an assumption

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that the converter building evacuation system at El Paso is 75% efficient and (2) use of the 15% emission factor for estimating potential converter fugitive emissions. EPA in the preamble to the proposed standards concedes that the El Paso building evacuation system is capable in theory of achieving 95% capture, but credits it with only 75% capture. The reason for this apparently is that, in order to alleviate "unacceptable working conditions, building openings have been increased, and [roof] ventilators designed for emergency use have been operated routinely." 48 Fed. Reg. 33141. In recent months, however, those roof ventilators have been blocked shut and sealed. Also, a large access door that was opened is now kept closed except to allow ingress and egress of converter cranes for maintenance. Experienced personnel at the smelter now estimate that the converter building evacuation system achieves from 85% to over 90% capture efficiency.

In addition, the use of a 15% emission factor now overestimates converter fugitive emissions of arsenic from the converters. The emission factor was based on testing of the baghouse inlet at El Paso, but that testing was done several years ago. In recent months a new computerized damper system has been installed in the primary converter hood flue system at El Paso. Using this computerized system, there have been very few fugitive emissions during blowing. As the PEDCo data from Tacoma (discussed above in connection with the Hayden smelter) show, potential converter fugitive emissions are drastically reduced when fugitive emissions are essentially eliminated during blowing.

C. Achievability of Emission Standard

The proposal would require that any gases captured by required fugitive emission controls be vented to either an electrostatic precipitator (cottrell) or a baghouse, which would be required to meet an emission standard of 11.6 milligrams of particulate per dry standard cubic meter. The English system equivalent is 0.005 grains per dry standard cubic foot. Because most of the sampling data is in grains, I shall refer to the proposal as setting a 0.005 grain standard. In ASARCO's view, the 0.005 grain standard is based on manifestly inadequate data. There are other data, much more numerous, showing baghouses not meeting 0.005 gr/dscf. This matter is of particular concern to ASARCO. If required by the standard to install additional fugitive controls, ASARCO intends to -- and EPA in the BID contemplates it would -- vent the captured fugitive emissions to existing cottrells and baghouses where they would be blended with other gases, some of them from process sources. EPA should set a standard that these existing devices can meet. In the absence of another alternative based on sufficient data, ASARCO recommends that the standard be 0.022 gr/dscf, which is the new source performance standard. 40 C.F.R. § 60.162. This level requires that any control device be properly maintained and operated.

The EPA proposal of 0.005 grains is based on only three samples taken at the converter building baghouse at El Paso, which are summarized at p. C-56 of the BID. The 0.005 grain emission standard is taken from the highest of the three samples, but three readings is too few samples to have any statistical significance for rulemaking purposes even for the El Paso baghouse. Certainly, it is an inadequate basis for applying the 0.005 gr/dscf

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standard to facilities industry-wide processing gases from various process and secondary emission sources.

It is worth noting in this regard that the total catch of particulate in all three samples even at the El Paso baghouse exceeded 0.005 gr/dscf. The proposal specifies EPA method 5, so ASARCO assumes that EPA intends to count only particulate collected ahead of and in the filter even when the sampling train contains impingers behind the filter. But if we are wrong in this regard and EPA intends to count total catch of particulate in determining compliance, then even the three sampling runs from El Paso fail to support the 0.005 grain standard.

In any event, data from other baghouses undercut the 0.005 grain proposal. The BID, pp. C-69 and C-84, contains data from baghouses at the Douglas and Anaconda smelters where the catch measured by method 5 exceeded 0.005 grains in 4 of 5 runs. Attached as Exhibit A is a table showing other baghouse sampling by EPA contractors and by ASARCO^{*/} where the average results for each set of samples exceeded 0.005 grains. Among them are data from August 1983 at the El Paso converter building baghouse where two sampling runs exceeded 0.005 gr/dscf. Overall, these data show it is no easy matter to meet the NSPS standard of 0.022 gr/dscf.

It is no answer to say that the offgases from the fugitive control ventilation systems will contain a lower inlet grain loading than the process gases being controlled at most (but not all) of these other baghouses, and to claim that as a result a baghouse or ESP treating collected fugitive emissions

^{*/} In listing sampling teams, "F&D" refers to samples performed by the Fume and Dust Recovery section of ASARCO's Central Engineering Department and "D.O.E.S." to those done by ASARCO's Department of Environmental Sciences.

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should be able to meet the 0.005 gr/dscf standard. First, there is no direct relationship between inlet loading of arsenic-containing particulate streams and outlet loading, as the following table of sampling results by EPA at the Tacoma metallic arsenic baghouse shows. The highest outlet loading corresponded to the lowest inlet loading even though inlet loadings varied by three fold. Note that all values are in grains of arsenic, not particulate, as is true with other sampling data discussed here.

<u>Inlet - gr.As/dscf</u>	<u>Outlet - gr.As/dscf</u>
1.48	.0019
3.47	.0016
3.78	.0012
3.09	.0008

The offgases collected by secondary converter hoods at ASARCO's Tacoma and Hayden smelters are processed by cottrells into which process gases are mixed, meaning that the inlet grain loadings will be higher. At Tacoma all of the secondary hood gas is passed through the No. 2 cottrell. Process offgases from anode furnaces and excess converter gases go to No. 2 cottrell, but EPA did not sample that cottrell. The recent monthly average particulate emissions from No. 2 cottrell, as measured by continuous monitors, are 0.003 and 0.004 gr/dscf. Since the monthly averages are so close to 0.005, it is quite likely that individual method 5 tests of the sort EPA would undertake to determine compliance might exceed 0.005 gr/dscf.

At the new Inco furnace operation at Hayden, gases captured by the secondary converter hoods, ventilation from the matte and slag tapping areas, and gases from the concentrate dryer baghouse will be treated in an ESP and vented to the 1,000 foot stack. The ability of this cottrell to meet the

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0.005 gr/dscf standard when processing all these gases is also of concern to ASARCO.

In short, EPA has an insufficient basis for adopting an emission standard of 0.005 gr/dscf. EPA should adopt instead the NSPS limit of 0.022 gr/dscf.

PARTICULATE LOADING
NON ASARCO BAGHOUSES
REPORTED BY VARIOUS INVESTIGATORS

<u>Baghouse</u>	<u>Particulate Loading</u> <u>Grains/SCF</u>		<u>Investigator</u>	<u>Reference</u>
	<u>Inlet</u>	<u>Outlet</u>		
Blast Furnace & Refinery	1.1799	0.0083	Roger W. Lee Imperial Smelting Ltd. Avonmouth England	EPA Document 12/79 EPA-600/2-79-211
Sinter Plant	1.7480	0.0087		
Lead Refinery	0.7866	0.0067		
Slag Fuming	28.40	0.0284		
Sinter Machine	1.4	0.001	Knowlton J. Caplan Industrial Health Engineering Associates	EPA Document 12/79 EPA-600/2-79-211
Sinter Machine	2.1	0.003		
Blast Furnace	2.0	0.05		
Blast Furnace	1.1	0.008		
Blast Burnace	2.6	0.006		
Blast Furnace	1.24	0.01	TRW & GCA	EPA Document TRW060842 11-10-80
Car Dumping	0.31	0.013		
Primary Crusher	2.37	0.006		
Truck Dumping	0.133	0.018		
Fine Crushing	1.31	0.004		
Primary Crusher	6.23	0.007		
Fuller Earth	5.24	0.002		
Fluid Energy	1.04	0.002		

EXHIBIT A

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PARTICULATE LOADING
VARIOUS ASARCO BAGHOUSES
OUTSIDE SAMPLING
DATA SUMMARY

<u>Sample Date</u>	<u>Plant</u>	<u>Baghouse</u>	<u>Particulate Loading Outlet Grains/SCF</u>	<u>Sampling Team</u>
9/79	East Helena	Main Stack (Sinter Plant Ventilation)	0.0491 0.0626 0.0609 Avg. 0.0575	Pacific Environmental Services - EPA Contract
9/79	East Helena	Zinc Furnace	0.0122 0.0137 0.0116 Avg. 0.0125	Pacific Environmental Services - EPA Contract
9/79	East Helena	Blast Furnace #1	0.0106 0.0131 0.00836 Avg. 0.01069	Pacific Environmental Services - EPA Contract
		Blast Furnace #2	0.00848 0.00990 0.0160 Avg. 0.01146	Pacific Environmental Services - EPA Contract
		Blast Furnace #3	0.0170 0.00835 0.00693 Avg. 0.01076	Pacific Environmental Services - EPA Contract

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PARTICULATE LOADING
VARIOUS ASARCO BAGHOUSES
ASARCO SAMPLING
DATA SUMMARY

<u>Sample Date</u>	<u>Plant</u>	<u>Baghouse</u>	<u>Particulate Loading Outlet Grains/SCF</u>	<u>Sample Team</u>
4/76	East Helena	Zinc Furnace	0.0028 0.0027 0.0031 Avg. 0.00287	F&D
6/73	El Paso	Blast Furnace	0.0125 0.0068 0.0051 Avg. 0.0081	F&D
6/73	El Paso	Zinc Baghouse	0.003 0.008 Avg. 0.0055	F&D
8/83	El Paso	Converter Baghouse	0.037 0.073 Avg. 0.055	F&D
5/80	Glover	Sinter Plant Ventilation	0.0285	D.O.E.S.
11/81	Glover	Sinter Plant Ventilation	0.018 0.019 0.031 0.019 Avg. 0.022	D.O.E.S.
3/82	Glover	Sinter Plant Ventilation	0.006 0.0067 0.0088 0.0062 Avg. 0.007	D.O.E.S.
5/80	Glover	Sinter Plant Main Stack	0.008	D.O.E.S.
8/81	Glover	Sinter Plant Main Stack	0.043 0.030 Avg. 0.036	D.O.E.S.
11/81	Glover	Sinter Plant Main Stack	0.011 0.009 0.023 Avg. 0.014	D.O.E.S.

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<u>Sample Date</u>	<u>Plant</u>	<u>Baghouse</u>	Particulate Loading Outlet Grains/SCF	<u>Sample Team</u>
1/81	Glover	Sinter Plant Main Stack	0.03 0.08 0.03 0.019 Avg. 0.04	D.O.E.S.
8/81	Glover	Blast Furnace	0.0073 0.007 0.005 0.006 Avg. 0.006	D.O.E.S.
11/81	Glover	Blast Furnace	0.0055 0.0013 0.0048 Avg. 0.004	D.O.E.S.
4/79	Newark	Reverberatory Furnace	0.023 0.031 0.032 Avg. 0.0287	D.O.E.S.
11/79	Newark	Reverberatory Furnace	0.009 0.004 0.004 Avg. 0.0057	D.O.E.S.

CHARLES R. COUNTS

(b) (6)

EDUCATION AND EXPERIENCE

Title and Position: Assistant Manager
Fume Recovery Section
Central Engineering Department
ASARCO Incorporated

Education-Schools Attended: Monett Junior College
Missouri School of Mines and Metallurgy
University of Illinois
USNR Midshipman School

Degree: B.S. in Metallurgical Engineering from
Missouri School of Mines and Metallurgy

Military Service: 3 years active duty
Serving various capacities ending career
as engineering officer

Professional Career: 10 years Metallurgist, Department Superintendent,
Assistant General Superintendent Federal Lead
Smelter of Asarco

2 years Assistant Superintendent, and General
Superintendent Detroit Aluminum Plant of Asarco

10 years Assistant General Superintendent
Alton Aluminum Plant of Asarco

14 years as engineer in Fume Recovery Section,
Asarco's Central Engineering Department

Present Duties: Participate and supervise development, design,
specification, and procurement of ventilation
systems, gas handling systems, and air cleaning
devices. My activities have included performance
testing of baghouses, scrubbers, electrostatic
precipitators, and acid plants.

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CHARLES R. COUNTS
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Adult Education:

<u>Course</u>	<u>Institution</u>
1. Industrial Supervision	Wayne State University
2. Elements of Time and Motion Study	Southern Illinois University
3. Dale Carnegie Course in Effective Speaking and Human Relations	Dale Carnegie Courses (F. N. Storey and Associates)
4. Welding	Alton Community School District
5. Industrial Ventilation and Air Pollution Control	Kellogg Center for Continuing Education (Michigan State)
6. Industrial Developments in Stack Gas Sampling and Monitoring (two courses)	Engineering Foundation Asilomar and Hueston Woods Park
7. Pneumatic Conveying for Bulk Solids	Center for Professional Advancement

November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF D.E. HOLT

My name is D.E. Holt. I am Manager of Design of the Central Engineering Department for ASARCO Incorporated. My curriculum vitae is attached.

I have been asked to testify regarding ASARCO's estimates of the capital costs for installing air curtain secondary converter hoods at ASARCO's Hayden and El Paso smelters and the annualized costs of operating those controls. EPA has substantially underestimated costs at Hayden and El Paso. At Hayden EPA estimates that the capital cost will be \$1,701,700 and the annualized cost will be \$408,400. BID, Tables 6-8 and 6-9. Actually, however, the capital costs would be \$3,660,000, twice the EPA estimate, and the annualized costs \$1,350,000, three times the EPA estimate. At El Paso, EPA estimates capital costs at \$1,375,200 and annualized costs at \$306,700. Ibid. Correct estimates would be significantly higher: \$1,851,000 in capital costs and \$726,000 in annualized costs.

EPA's estimates are too low for several reasons. First, the EPA estimate is derived from a 1981 estimate prepared by ASARCO regarding the capital costs for installing air curtain secondary hoods at Tacoma. After certain adjustments, EPA derived from these data a per converter estimate of \$322,200 for each air curtain and secondary hood enclosure. This figure was

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in turn used to estimate costs at other smelters. Because of individual plant differences use of cost estimates for one plant to estimate costs at another plant is inappropriate for any purpose other than a rough guess. Plant configurations obviously differ in significant ways.

For example, the converter aisle at ASARCO-Hayden is approximately 4 feet narrower than the aisle at Tacoma. The distance from the centerline of the converter to the edge of the secondary hood on the converter aisle is important. A shorter distance than the 17.5 feet dimension of the hood at Tacoma would mean less enclosure with more fume drifting out into the converter aisle. A hood as wide as that at Tacoma would, however, block the necessary movement of equipment through the converter aisle at Hayden. To deal with this problem, more expensive cantilevered hoods would be needed, narrow enough at the bottom to allow equipment to pass, but also 17.5 feet wide at a height necessary to capture emissions.

EPA's estimates also reflect certain other incorrect assumptions. For instance, EPA assumed that the existing converter building baghouse fans would become surplus at El Paso and ASARCO could use them in the air curtain. BID, p. 6-14. In fact, however, ASARCO would continue to operate those fans in the baghouse and would have to install new secondary hood fans. Similarly, EPA assumes that ASARCO at Hayden will not have to add any new duct work. Ibid. In fact due to the differences in the ventilation for the existing secondary hoods and the air curtain hoods, there would necessarily be some replacement of ventilation ducts, and it may in fact turn out to be less expensive to replace most of the existing ducts. Moreover, EPA's estimate for Hayden does not take into account that the existing secondary hoods will have to be removed if air curtain hoods are to be installed.

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With this general introduction, I will first give ASARCO's estimates, first at Hayden and then at El Paso, of the capital costs and annualized costs of installing air curtain secondary hoods.

A. Costs at Hayden

1. Capital Costs. Attachment A is the estimated capital cost for installing "new secondary hood installation -- basic" at ASARCO's Hayden plant. As summarized there, the total estimate is \$3,660,000. This is the estimate of the costs for five hoods that would fit into the current converter aisle at Hayden. As noted above, they would have to be cantilevered to fit into the current aisle and be as wide at the top as the Tacoma hoods. This estimate is just the capital cost of installation. It does not include production that would be lost during installation because one or more converters would be out of operation.

Moreover, the cost estimate, while including the cost of removing the existing secondary hoods, does not include the cost of writing off ASARCO's investment in the existing secondary hoods. The total capital cost of those hoods, ventilation, and ducting was \$4.4 million, of which \$1.59 million was for the hoods alone. The remaining book value of the hoods alone is \$797,000. It is estimated that scrapping both these hoods and the surrounding oftakes, dampers, winches, and foundations would lead to a book write-off of about \$1 million.

As noted, the capital cost of \$3.66 million is for hoods that will fit into the current converter aisle at Hayden. Not only is that aisle narrower than at Tacoma, the crane rail elevation is 5 feet lower. This means that the secondary hood enclosure and the air curtain jetstream must be lower

and closer to the converter mouth. This decreased height is a very significant dimension, as EPA engineers who have reviewed the Tacoma hood know. The lower enclosure will not be as efficient in corralling fumes as the hood enclosure at Tacoma. One important reason is that the crane block will be in the air curtain jet stream when the crane is in operation at the converter. It is not possible to determine precisely how much effectiveness might be impaired, but ASARCO personnel agree that air curtain secondary hoods at Hayden would be significantly less effective than the hoods at the Tacoma smelter. In fact, it is quite possible that the air curtain secondary hoods would be less efficient at Hayden than the existing fixed secondary hoods.

Raising the crane rail would be the only effective way to alleviate this problem. Nothing in the proposed standards would require the raising of the crane rail. Indeed, the preamble makes it clear that EPA does not intend to require smelters to rebuild their converter aisles to install hoods of some specific dimensions. 43 Fed. Reg. 33133. But to show how quickly costs escalate even further if a smelter has to rebuild its converter aisle, ASARCO has estimated the capital costs of raising the crane rail at Hayden and installing five hoods of the same height as the Tacoma hoods. These estimates are summarized in Attachments B and C and are captioned "Secondary Hood Installation -- Alternate, Hayden Plant" and "Converter Aisle Crane Modification." The capital costs for the Tacoma-size hoods are \$4 million. The capital costs for raising the crane rail 5 feet are about \$8.1 million. In addition to these costs, raising the crane rail would require the smelter to be shut down for at least one month. The costs of such a shutdown would include lost production, salaries, electric power costs under take or pay contracts, etc., and are estimated to run about \$200,000 per day or \$6 million per month. Thus the

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total cost for raising the crane rail at Hayden and installing air curtain secondary hoods similar to those at Tacoma would be approximately \$18 million.

This cost far exceeds anything that would be reasonable to require, given the small amounts of fugitive emissions emitted by the Hayden smelter.

2. Annualized Costs. EPA relies heavily on annualized costs in its analysis. To turn ASARCO's estimate of capital costs into annualized cost of capital, we have used a factor of 17.1%, which is the equivalent of assuming at 15 year life on equipment and a 15% cost of capital. Both of these assumptions are conservative. The expected life of equipment can be more accurately summarized as being 10 years, rather than 15 years, given the likelihood of damage to the hoods during the course of operation. The 10% cost of capital in EPA's estimates is much too low. The 15% figure used in ASARCO's estimates is less than the weighted cost of capital derived from the formula contained in EPA's proposed nonferrous smelter order regulations (48 Fed. Reg. 42050).

These assumptions yield an annual cost of capital recovery on the basic secondary hoods of \$626,000 ($0.171 \times \3.66 million). We estimate operating costs at \$185,000 during the first year, using electrical costs of 4.5 cents per kilowatt hour, which are estimated to increase at a rate of 10% per year. We also estimate the maintenance costs at 5% of the capital costs, or \$183,000, also increasing at 10% a year. We think this approximation is reasonable because we expect maintenance costs to be relatively high given the narrowness of the converter aisle and the likelihood of damage. These figures would lead to a first year annualized cost of the hoods alone of \$994,000, or a cost for the first five years of \$5,376,000. This would be broken down as follows:

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ANNUALIZED COSTS

	<u>Capital Recovery</u>	<u>Operating</u>	<u>Maintenance</u>	<u>Total</u>
Year 1	\$ 626,000	\$ 185,000	\$ 183,000	\$ 994,000
Year 2	626,000	203,500	201,300	1,030,800
Year 3	626,000	223,900	221,400	1,071,300
Year 4	626,000	246,200	243,600	1,115,800
Year 5	626,000	270,900	267,900	1,164,800
Subtotals	\$3,130,000	\$1,129,500	\$1,117,200	\$5,376,000

To these figures, some cost should be added to take into account the need to scrap and write off much of the existing secondary hoods and surrounding equipment. As discussed above, the estimate of this write-off at book value was \$1 million. Under normal accounting, this would be written off as a loss in the first year. But for purposes of current analysis, we shall capitalize it. Using the assumptions discussed above, this yields an annualized capital cost of \$171,000.

Finally, some account should be taken of the secondary hoods' pro rata share of the cost of operating the electrostatic precipitator. Any captured fugitive emissions at Hayden would be treated in what is now called the R&R cottrell and vented to the 1,000 foot stack. The operating costs of that cottrell in 1982 were \$404,000. It is estimated, on a standardized gas volume basis, that 46% of the gases treated by this cottrell would come from secondary converter hoods. Using 46% as an indication of the share of the cottrell's cost attributable to the secondary hoods yields an expense figure of about \$185,800.

Summing up these various figures yields an annualized cost of about \$1,350,000, for the first year alone -- a figure that would increase in succeeding years. This estimate is over three times as high as that of EPA.

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B. Costs at El Paso

EPA has also underestimated the costs of installing air curtain secondary hoods at El Paso. Unlike the case with Hayden, hoods of dimensions similar to those at Tacoma will fit in the converter aisle at El Paso. Attachment D is a summary of the capital costs prepared in March 1981 by the design section of ASARCO's Central Engineering Department. It estimates total cost at \$1.558 million. Adjusting this for subsequent inflation using the Engineering News index yields a revised estimate of \$1.851 million.

This figure can be turned into annualized costs using the same assumptions discussed in connection with the Hayden smelter. One difference, however, is that here a somewhat smaller factor of 3% is used to estimate maintenance costs. The results are seen in the following table:

	<u>Capital Recovery</u>	<u>Operating</u>	<u>Maintenance</u>	<u>Total</u>
Year 1	\$ 318,000	\$ 105,000	\$ 56,000	\$ 479,000
Year 2	318,000	115,500	61,600	495,100
Year 3	318,000	127,000	67,800	512,800
Year 4	318,000	139,800	74,500	532,300
Year 5	318,000	153,700	81,100	552,800
Subtotals	\$1,590,000	\$ 641,000	\$ 341,000	\$2,572,000

As can be seen, the estimated costs for the first year are \$479,000 and are \$2.57 million for the first five years. To this should be added the costs of the pro rata share for operating the converter building baghouse, which would treat any offgases captured by the air curtain secondary hoods. In 1982, the operating costs for that baghouse were about \$495,000. It is estimated that, if secondary hoods were installed, about 50% of gas volume treated in the baghouse would come from those hoods. This indicates an annual baghouse operating cost of \$247,500, which in turn indicates an estimated total annualized cost of air curtain hoods at El Paso in the first year of \$726,500.

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Attachment A

ASARCO

SUMMARY JOB COSTS

PROJECT New Secondary Hood Installation - BASIC

Hayden Plant ENR INDEX 4118

C.E. PROJECT NO. EA-84-H

EST. BY DESIGN SECTION

EST. AREA/S

HGB

C'KD. BY DEHDwg No. H-32422-1001-GDATE 8-8-83

DIRECT COSTS		ESTIMATED COSTS		% OF TOTAL CAPITAL COSTS
ACCT. NO.	DESCRIPTION			
1000	DEMOLITION & EARTHWORK	\$ 155,400		
2000	CONCRETE	89,900		
3000	PROCESS STRUCTURES	1,180,000		
4000	GENERAL EQUIPMENT			
5000	PROCESS EQUIPMENT	532,800		
6000	PIPING	36,000		
7000	ELECTRICAL	80,000		
8000	INSTRUMENTATION	14,400		
9000	PAINTING	107,000		
TOTAL ESTIMATED DIRECT COSTS		\$2,195,500		
INDIRECT COSTS				
ENGINEERING				
DESIGN & SPECIFICATIONS		175,000		
PROCUREMENT		18,000		
FIELD SUPERVISION		36,000		
CONTRACTORS FIELD DISTRIBUTABLES		396,000		
ESCALATION				
ENGINEERING SERVICES		9,000		
PROJECT EQUIPMENT		7,500		
BULK MATERIALS - CONSTRUCTION		104,000		
PROJECT LABOR		46,000		
CONTRACTORS FIELD DISTRIBUTABLES		32,000		
TOTAL FIELD & ENGINEERING EXPENSE		\$3,020,000		
CONTINGENCIES		453,000		
FEES:				
CONTRACTORS FEE OR PROFIT		122,000		
LICENSES AND/OR ROYALTIES				
TOTAL ESTIMATED CAPITAL COSTS		\$3,595,000		
APPLICABLE TAXES - MATERIALS, EQUIPMENT				
1,300,000 a 5 %		65,000		
TOTAL ESTIMATED PROJECT COSTS		\$3,660,000		
ESTIMATED LIFE OF PROJECT		12	mo	

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Attachment B

ASARCO

SUMMARY JOB COSTS

PROJECT New Secondary Hood Installation - ALTERNATE

Hayden Plant

ENR INDEX 4118

C.E. PROJECT NO. EA-84-F

EST. AREA/S

EST. BY DESIGN SECTION

HGB FRP

C'D. BY DEH

DATE 8-8-83

Dwg. No. H-32422-1001-G

DIRECT COSTS		ESTIMATED COSTS		% OF TOTAL CAPITAL COSTS
ACCT. NO.	DESCRIPTION			
1000	DEMOLITION & EARTHWORK	\$ 155,400		
2000	CONCRETE	109,300		
3000	PROCESS STRUCTURES	1,358,900		
4000	GENERAL EQUIPMENT			
5000	PROCESS EQUIPMENT	532,800		
6000	PIPING	41,500		
7000	ELECTRICAL	80,000		
8000	INSTRUMENTATION	14,400		
9000	PAINTING	121,000		
TOTAL ESTIMATED DIRECT COSTS		\$2,413,300		
INDIRECT COSTS				
ENGINEERING				
DESIGN & SPECIFICATIONS		193,500		
PROCUREMENT		20,000		
FIELD SUPERVISION		39,500		
CONTRACTORS FIELD DISTRIBUTABLES		435,000		
ESCALATION				
ENGINEERING SERVICES		10,000		
PROJECT EQUIPMENT		8,300		
BULK MATERIALS - CONSTRUCTION		114,400		
PROJECT LABOR		50,500		
CONTRACTORS FIELD DISTRIBUTABLES		35,500		
TOTAL FIELD & ENGINEERING EXPENSE		\$3,320,000		
CONTINGENCIES		498,000		
FEES:				
CONTRACTORS FEE OR PROFIT		134,000		
LICENSES AND/OR ROYALTIES				
TOTAL ESTIMATED CAPITAL COSTS		\$3,952,000		
APPLICABLE TAXES - MATERIALS, EQUIPMENT				
<u>1,300,000</u> @ <u>5</u> %		65,000		
TOTAL ESTIMATED PROJECT COSTS		\$4,017,000		
ESTIMATED LIFE OF PROJECT		<u>12</u> mo.		

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Attachment C

SUMMARY JOB COSTS			
PROJECT <u>Hayden Plant Phase III Study</u>		ASARCO	
<u>Converter Aisle Crane Mod.</u>		ENR INDEX <u>4118/3878</u>	
C.E. PROJECT NO. <u>EA-76-H</u>		EST. BY DESIGN SECTION	
EST. AREA/S _____		AOM _____	
_____		C/KD. BY _____	
_____		DATE <u>8-12-33</u>	
DIRECT COSTS		ESTIMATED COSTS	
ACCT. NO.	DESCRIPTION		% OF TOTAL CAPITAL COSTS
1000	DEMOLITION & EARTHWORK	\$ 143,000	
2000	CONCRETE w/o paving	252,000	
3000	PROCESS STRUCTURES	3,422,000	
4000	GENERAL EQUIPMENT		
5000	PROCESS EQUIPMENT w/o replacing cranes	460,000	
6000	PIPING	150,000	
7000	ELECTRICAL	270,000	
8000	INSTRUMENTATION		
9000	PAINTING	184,000	
TOTAL ESTIMATED DIRECT COSTS		\$4,881,000	
INDIRECT COSTS			
ENGINEERING			
DESIGN & SPECIFICATIONS		480,000	
PROCUREMENT		48,000	
FIELD SUPERVISION		64,000	
CONTRACTORS FIELD DISTRIBUTABLES		878,000	
ESCALATION			
ENGINEERING SERVICES		32,000	
PROJECT EQUIPMENT		6,000	
BULK MATERIALS - CONSTRUCTION		262,000	
PROJECT LABOR		118,000	
CONTRACTORS FIELD DISTRIBUTABLES		52,000	
TOTAL FIELD & ENGINEERING EXPENSE		\$6,821,000	
CONTINGENCIES @ 15%		1,023,000	
FEES:			
CONTRACTORS FEE OR PROFIT		250,000	
LICENSES AND/OR ROYALTIES			
TOTAL ESTIMATED CAPITAL COSTS		\$8,094,000	
APPLICABLE TAXES - MATERIALS, EQUIPMENT			
<u>2,900,000</u> @ <u>5</u> %		145,000	
TOTAL ESTIMATED PROJECT COSTS		\$8,239,000	
ESTIMATED LIFE OF PROJECT <u>14</u> mo.		Pg. 1 of 1	

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Attachment D

SUMMA JOB COSTS		ASARCO	
PROJECT <u>Secondary Hoods on Converters</u>			
<u>El Paso</u> ENR INDEX <u>3388</u>			
C.E. PROJECT NO. <u>EA-39-EP</u>	EST. BY DESIGN SECTION		
N.Y. APPRO. NO. _____	RRJ FRP _____		
PLANT NO. _____	C'KD. BY <u>A.O. Marsh, Jr.</u>		
DWG. NO. <u>EP-31225 & EP-31226</u>	DATE <u>Mar. 25, 1981</u>		
DIRECT COSTS		ESTIMATED COSTS	
ACCT. NO.	DESCRIPTION		% OF TOTAL CAPITAL COSTS
1000	DEMOLITION & EARTHWORK	\$ 7,000	
2000	CONCRETE	17,800	
3000	PROCESS STRUCTURES	453,000	
4000	GENERAL EQUIPMENT		
5000	PROCESS EQUIPMENT	184,500	
6000	PIPING	10,000	
7000	ELECTRICAL	157,800	
8000	INSTRUMENTATION	40,000	
9000	PAINTING	25,000	
TOTAL ESTIMATED DIRECT COSTS		\$ 895,100	
INDIRECT COSTS			
ENGINEERING			
	DESIGN & SPECIFICATIONS	126,000	
	PROCUREMENT	3,900	
	FIELD SUPERVISION	29,000	
	CONTRACTORS FIELD DISTRIBUTABLES	108,000	
ESCALATION			
	ENGINEERING SERVICES	12,000	
	PROJECT EQUIPMENT	25,000	
	BULK MATERIALS - CONSTRUCTION	70,000	
	PROJECT LABOR	25,000	
	CONTRACTORS FIELD DISTRIBUTABLES	10,000	
TOTAL FIELD & ENGINEERING EXPENSE		\$1,304,000	
CONTINGENCIES		195,000	
FEES:			
CONTRACTORS FEE OR PROFIT		24,000	
LICENSES AND/OR ROYALTIES			
TOTAL ESTIMATED CAPITAL COSTS		\$1,523,000	
APPLICABLE TAXES - MATERIALS, EQUIPMENT			
700,000	a 5 %	35,000	
TOTAL ESTIMATED PROJECT COSTS		\$1,558,000	
ESTIMATED LIFE OF PROJECT <u>15</u> mo.		Pg. 1 of 1	

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RESUME

D. EDWARD HOIT, P.E.

(b) (6)

Salt Lake City, Utah 84117

(b) (6)

EXPERIENCE

(b) (6)

Employed by ASARCO Incorporated, Central Engineering Department. Initially employed as a design engineer. During this time conducted several feasibility studies for the El Paso Plant, primarily.

(b) (6) assigned as resident project engineer at engineering contractor firm during design of a new lead ore processing facility. Responsibilities included review and approval of design drawings, equipment, material and construction specifications and purchases of equipment. Cost control estimate was developed at this time.

(b) (6) assigned as resident project engineer at contract engineering firm for design of the Hayden, Arizona Copper Smelter Oxygen Flash Furnace. Responsibilities included interim approval of drawings, specifications and purchase requisitions.

(b) (6). Assigned as Manager of Design Engineering. Section provides design services to Asarco's smelting and mining facilities, develops cost appropriation estimates for new facilities and retrofit work at existing operational sites. This section also provides design project engineers to oversee engineering contract work.

(b) (6)

Employed at Pullman Torkelson Company, an engineering and construction firm which designed and constructed facilities to serve the non-ferrous metals industries, public utilities and surface coal mine operators.

Project assignments included working as senior mechanical engineer, project engineer and project manager on several major projects and as advisor/consultant on several smaller projects. Specific project experience included heavy fuel oil receiving and distribution systems at four separate facilities of a major copper producer, work on a unit train loading facility for a major surface coal mine operator, and coal receiving, unloading and processing facilities for electric generating stations.

Project responsibility was the design of specific equipment parameters, development of specifications, development of facility startup manuals, project direction and coordination of the various engineering disciplines and home office project management of all phases of major projects beginning

Resume, D. Edward Holt, continued:

2.

with design concepts, followed by detail engineering, procurement, facility construction and startup.

Equipment applied in these projects included belt conveying system, crushers; vibrating and reciprocating feeders, rail car rotary dumper/positioner, dust collectors, pumps, boilers, dust suppression systems and rail car infrared thawing systems.

(b) (6)

Employed as an aerospace engineer by the U.S. Air Force at Hill Air Force Base, Utah. Assigned as a staff engineer and project engineer for specific short duration projects as well as ongoing engineering programs for the Air Force Logistics Command.

Major projects and programs were of significant responsibility, which included:

- a. Development of a mathematical model and computer program for the external ballistics of an air to air rocket for feasibility testing in the air to ground mode.
- b. Design, fabrication supervision and first article installation of a ram-air inlet to provide cooling air for a laser camera system installed in several RF-4C aircraft.
- c. Developed weapons certification program, analyzed test data and provided certification documentation for application of specific weapons on Hill Air Force Base assigned aircraft.
- d. Directed the efforts of four other engineers in developing engineering inspection criteria, flight loads data gathering and analysis programs and aircraft structural modification programs.

EDUCATION AND PROFESSIONAL INFORMATION:

B.S.M.E., University of Utah (b)

M.S., University of Utah (b)

Registered Professional Engineer, State of Utah, Registration No. (b)

Subsequent formal and short courses have been taken in Plasticity in Metals, Fatigue in Structures, Engineering Statistics Critical Path Scheduling, and Project Management.

PERSONAL DATA:

Born (b) (6)
(b) (6))

Typed October 5, 1983

Attachment 10 of A-80-40 IV-F-2

November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF LAWRENCE W. LINDQUIST

My name is Lawrence W. Lindquist. I am Plant Manager of ASARCO's Tacoma smelter. I testified in the hearings held in Tacoma last week. My statement in that hearing listed my educational and work background. As detailed in that statement, I have previously served in the Tacoma plant as smelter superintendent and, earlier, as head of the converter, reverberatory, anode, and other departments.

I am here to comment upon the converter work practice requirements contained in the proposal. My comments in this regard relate not only to the Tacoma smelter but also to ASARCO's other copper smelters. Some of the proposed requirements relate to the sort of work practices we would to the extent practicable do anyway, such as optimizing the air curtain before rolling out the converter. ASARCO strongly objects, however, to the proposed requirement that the crane operator hold the ladle off the ground during skimming to minimize the drop distance between the converter mouth and the ladle. That requirement will lead to a significant decrease in productivity and will increase safety hazards. In addition, ASARCO opposes minimum time limits for any of the work practice requirements.

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A. Requirement That the Ladle Be Held Off the Ground

The proposal would require the crane operator during skimming to hold the ladle off the ground to minimize drop distance between converter mouth and ladle. § 61.172(a)(2)(ii)(C); § 61.182(a)(2)(ii)(C). The apparent purpose of this requirement is to minimize fuming during slag skimming. I am not aware, however, of any attempt by EPA to quantify the reduction in emissions that would occur as a result of the proposed requirement and one facet of the proposed requirement is counterproductive from an environmental standpoint. Making the crane operator hold the ladle off the ground will place the crane cable in the air curtain jet stream during the skim. This will hinder the effectiveness of the air curtain. Consequently, the environmental benefits of the proposed requirement are unknown. Weighed against these doubtful benefits are the significant losses of productivity and the increased safety hazards that would result from the proposed requirement.

The normal smelter practice is to have a ladle in place at the converter ready for skimming. In part the ladle is there to handle occasional upsets in which a converter boils over and must be poured out. More typically, the ladle will be in place because a crane might not be available at the time slag is to be skimmed. To understand why this is so requires an appreciation of the complex activities along the converter aisle and the many functions performed by the crane operators. A smelter will generally have two or three cranes. They perform, among other things, the following functions: (1) transferring matte to the converters, (2) transferring blister copper to the anode furnaces, (3) transferring converter slag to the smelting furnace, and (4) loading ladles with scrap and aisle reverts and charging these materials to the converters. It must be appreciated that a smelter does not run on a

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clockwork schedule. Coordination between the various operations is spotty at best because of the unpredictable nature of smelting. The time for a slag blow, for instance, differs from blow to blow. Because the crane operators have several functions and must service several converters, a crane might not be available when the converter operator is ready to skim. The converter operator will usually skim the slag into the ladle already in place on the ground, and the crane operator will pick up the ladle when he is free to do so.

A requirement that the ladle be held off the ground would greatly hinder efficient operations along the converter aisle. During the several minute period the crane operator would be holding the ladle he would be prevented from performing other important duties such as servicing other converters or the anode furnaces. The crane holding the ladle will also block the converter aisle and prevent part of the aisle from being serviced by other cranes.

Moreover, cranes must be taken out of service for daily maintenance or repair; during this period only one crane is available at most smelters, and it may be required to perform duties other than holding the ladle. If the proposed requirement goes into effect, the remaining crane would either have to ignore its other duties while holding the ladle during a skim or the converter needing a skim would have to be idled until a crane was free. In short, the proposed work practice would significantly hinder production.

Further, the proposed requirement would increase safety hazards to smelter workers. While installation of the prototype air curtain secondary hood at Tacoma has resulted in greatly reduced fugitive emissions from converter operations, it has presented an operating problem in regard to heat

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exposure on the converter crane. The secondary hood structure channels the heat emitted during skimming and charging operations directly out and upward toward the crane aisle. ASARCO has already had to install additional heat shields on a crane cab at Tacoma and has been forced to replace crane electrical wiring with special heat-resistant materials. This problem would, if anything, be worse at Hayden if air curtain hoods were installed there because the crane rail is lower and thus that much closer to the heat being given off by the converters.

A requirement that the crane operator hold the ladle during a skim would greatly increase the heat burden on the crane block, cables, and cab. At worse such a requirement could lead to a significant safety hazard; at best the requirement would lead to increased costs as equipment would have to be replaced and repaired more frequently. One safety hazard results from the fact that the crane cables would be setting in the middle of the blast of heat from the converter's mouth. This increases the risk that a cable will break due to heat fatigue. Cables are, of course, inspected frequently. They are checked at the beginning of every shift, but increasing the heat exposure for cables increases to some extent the risk of a cable breaking. I am sure EPA is aware that death or serious injury might result should a cable snap and a ladle drop.

Another safety hazard is that the increased heat can also warp the glass or plexiglass in the crane cab. Either this glass will have to be replaced much more often or the warped glass could obscure the crane operator's vision, leading to significant safety hazards.

In sum, the proposed requirement would lead to a significant decrease in productivity and to increased safety hazards.

B. Minimum Time Periods

EPA has requested public comment on whether minimum time periods should be specified for certain work practices. 48 Fed. Reg. 33134. ASARCO believes that any such time periods are unwarranted and would necessarily be arbitrary.

1. The proposed regulations require the air screen and exhaust flow rates to be increased to their optimum conditions prior to raising the primary hood and rolling the converter out for skimming. To specify a minimum period of increased flow rate prior to rolling out the converters, whether it be 5 seconds or 30 seconds, would serve no regulatory purpose and would instead preclude the operator from exercising his judgment on how best to ensure capture of emissions during skimming. Moreover, such a requirement might be counterproductive since it could increase the air volume going to the electrostatic precipitators, which might decrease the ESP's collection efficiency.

2. The proposed regulations require the converter operator to hold the rolled out converter in an idle position until fuming from the molten bath ceases prior to commencing skimming. The operator should be able to use discretion to determine the appropriate length of any such idle period.

3. The proposal requires that the rate of flow from the converter mouth to the receiving ladle be controlled to minimize fuming. It would be inappropriate to specify a rate of skimming; crane requirements, the quantity of slag involved, and other operations in the converter aisle necessitate that operators have discretion to determine the rate of skimming required to control emissions and satisfy operational needs.

4. The proposal requires that, upon completion of a charge, the crane operator shall withdraw the charging ladle from the confines of the hood

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enclosure in a slow and deliberate manner. The length of time a charging ladle should be left in the hood must also depend upon operator discretion. A minimum time requirement would be unnecessary.

* * * *

In conclusion, ASARCO strongly urges EPA to delete from the final regulation any requirement that the crane operator must hold the ladle off the ground during a skim. We also urge EPA not to adopt any time limits. The copper industry in the United States is operating under severe enough competitive disadvantages. We urge EPA not to adopt work practice requirements that will further decrease productivity without any clear environmental benefit.

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Attachment 11 of A-80-40 IV-F-2

November 8, 1983

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards
for Hazardous Air Pollutants;
Proposed Standards for
Inorganic Arsenic

Docket No. A-80-40

STATEMENT OF DONALD A. ROBBINS

My name is Donald A. Robbins. I am Supervisor of Environmental Sciences in the Department of Environmental Sciences at ASARCO Incorporated. I have held this position since September 1, 1981. Prior to that I was Supervisor of Laboratory Services at ASARCO. I have a Bachelor's Degree in Chemistry from Lafayette College and have pursued graduate study in both chemistry and industrial hygiene at Seton Hall University and the University of Utah.

I will comment today upon two technical aspects of the proposed NESHAPS for inorganic arsenic. I have two basic points. First, the use of transmissometers measuring opacity is a poor way to monitor compliance with the proposed standard. An annual compliance audit would be a better means. Second, while the proposed Methods 108 and 108A now appear to be achieving reliable results in analyzing for arsenic, there remain significant problems with them. ASARCO's time-proven analytical methods should be recognized alternatives for analysis of arsenic.

A. Opacity Monitoring

Under the proposed regulations, those primary copper smelters required to equip their converters with air curtain secondary hoods and to

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ventilate matte and slag tapping areas are subject to an emission limitation of 11.6 mg/dscm (0.005 gr/dscf) on total particulate matter discharged into the atmosphere from the baghouse or electrostatic precipitator to which the ventilation gases have been sent. § 61.172(b); § 61.182(b). Compliance with this emission limitation is to be monitored by continuous operation of an opacity measurement device, a transmissometer, in order to find occurrences during which opacity exceeds a level that has been determined to be the 97.5% upper confidence limit of a distribution of the average opacity readings taken when the source is in compliance with the 0.005 gr/dscf standard. § 61.176(a)(3); § 61.186(a)(3). Any such "excess opacity" occurrence must be described in semi-annual reports to EPA. § 61.178(d); § 61.188(d).

The proposed regulations do not clearly state the consequences of an excess opacity reading. It is our understanding, however, that an excess opacity reading would not constitute a violation of the emission standard. Such strict reliance on transmissometers would be unjustifiable. What appears to be contemplated is that excess opacity readings will be reported and then EPA may ask the source to explain why the excess opacity reading did not result from a violation of the emission standard and to conduct Method 5 compliance tests. If appropriate, a source may redetermine the opacity distribution associated with the 0.005 grain emission standard.

ASARCO is concerned about the proposed use of a transmissometer to monitor compliance with the 0.005 gr/dscf emission requirement. As stated elsewhere in ASARCO's comments, we do not believe that the 0.005 gr/dscf is adequately supported. But if that standard is achieved and verified by Method 5, opacity measurements using transmissometers will not provide a reliable way to monitor compliance.

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In the first place, the accuracy of a transmissometer's reading will depend heavily upon the particle size distribution of the gas streams in compliance with the standard. It is likely that the opacity levels associated with a .005 gr/dscf emission standard would be close to or at the transmissometer's limit of detection. One manufacturer of transmissometers whom we have contacted, Lear Siegler, has expressed concern about using a transmissometer as a surrogate for compliance testing with a 0.005 gr/dscf limit. They believe that frequent Method 5 testing would be needed to determine the validity of using a transmissometer in this fashion. EPA's purpose in requiring transmissometers was, of course, to avoid frequent use of costly Method 5 testing.

Second, ASARCO has had frequent maintenance problems with its existing transmissometers. Although the proposed regulations recognize that continuous monitoring will not be possible when breakdowns, repairs, and calibration checks and adjustments occur, such frequent maintenance problems are costly and undercut the usefulness of the monitoring requirement.

Third, because secondary hood gases at ASARCO would be blended with other gases prior to entering the particulate control device, subtle changes in particle size due to other operations could adversely affect opacity but not grain loading. For example, at Tacoma secondary hood gases are often blended with anode furnace, converter bypass, and other ventilation gases prior to entering the ESP.

For the above reasons, ASARCO submits that opacity monitoring is a poor way to monitor compliance with the 0.005 gr/dscf standard. ASARCO would prefer annual emission source sampling audits using Method 5 to assure

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compliance, along with a requirement that routine maintenance of control equipment be undertaken and records of such maintenance be kept.

B. Methods 108 and 108A

The EPA proposal would require that any stack sampling for arsenic be done using the new Method 108 and that any analysis of ores, matte, and slag be done using the new Method 108A. In ASARCO's view, these methods appear to be reliable, but there are problems with them and they should not be the only approved ways to analyze for arsenic. ASARCO's current methods should be recognized alternative methods of analysis.

It is understood that, due to the complexities of accurately sampling and analyzing arsenic emissions, EPA could not use any of its existing sampling and analytical procedures but needed to develop new procedures. Since 1980 ASARCO has worked with EPA to determine if the analyses obtained by the new Methods 108 and 108A were consistent with the protocols that had been traditionally used in the nonferrous industry to analyze for arsenic in various matrices. Based on recent analytical comparisons of results obtained by FEDCo Environmental, EPA's contractor, and ASARCO's Department of Environmental Sciences, it appears that the new protocols are producing reliable analytical data. There are, however, certain problems with the Methods 108 and 108A, which are discussed below. Moreover, the fact that the accuracy of these new protocols was checked by reference to analyses done by ASARCO using its time-proven methods shows that ASARCO's methods should be allowed as alternatives to the proposed EPA method. Copies of the various ASARCO protocols are attached. Attachment A is the protocol for volumetric determination of arsenic by titration with potassium bromate. This procedure is used at

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Tacoma for analyzing ore concentrates or products, such as arsenic trioxide, which contain relatively high concentrations of arsenic (greater than 2%). Attachment B is the protocol for analysis of arsenic in matte and slag using atomic absorption spectroscopy. Attachment C is the protocol for colorimetric determination of arsenic, which is used for analyzing trace amounts of arsenic. These three proven laboratory procedures should be recognized by EPA as alternatives in the proper context for Methods 108 and 108A.

Allowing these ASARCO methods as alternatives is important because of the following problems with the protocols for analysis and sampling under Methods 108 and 108A:

1. One problem is with the use of a Parr Digestion Bomb to dissolve arsenic in samples. Method 108A requires that an appropriate sample (50-500 mg) of matte, slag or concentrate be introduced into the bomb prior to the addition of concentrated nitric and hydrofluoric acids. The bomb is then sealed and placed in an oven for two hours at 105°C. At the conclusion of the two-hour period the bomb is removed from the oven, cooled, opened, and the contents passed through a Whatman #4 filter paper into a polypropylene volumetric in preparation for aspiration into an atomic absorption spectrophotometer.

This method has a significant cost since the purchase price of the Parr Digestion Bomb is approximately \$150 per unit. More importantly, the failure to control the bomb temperature accurately can lead to a violent explosion. At least two explosions have occurred during EPA's development of the methods. One explosion resulted from use of a mixed ester of cellulose filter, rather than a paper Whatman No. 4, causing formation of unstable cellulose nitrate. Changing the filter medium should remedy that problem.

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But an unknowing laboratory could inadvertently substitute a cellulose filter for Whatman filter media. Nothing in the proposed method warns of this danger.

A second explosion occurred in the FEDCo laboratory during the most recent dissolution of Tacoma plant concentration feed. Smaller sample sizes will apparently remedy this problem, but this explosion further highlights the uncertain safety in the Method 108A protocol.

Instead of using a Parr Digestion Bomb to dissolve the arsenic in samples, ASARCO digests arsenic in slags and matte using a mixture of mineral acids (nitric, hydrochloric, hydrofluoric, perchloric) heated by a hot plate for approximately 20 minutes in a common laboratory beaker or flask as opposed to two hours in a Parr Digestion Bomb under Method 108A. Unlike Method 108A, no precise control of the temperature is needed.

In sum, ASARCO objects to the Parr Digestion Bomb because of the cost of the bomb itself, the length of time required for dissolution, and the uncertain safety of the bomb.

2. Another problem with Methods 108 and 108A relates to the filtration steps after sample dissolution. This filtration procedure not only takes analyst's time but provides a source of possible contamination to the sample. Because they use a more rapid analytical protocol that does not introduce another source of contamination, ASARCO's protocols are, we believe, superior.

3. The proposed Methods 108 and 108A use atomic absorption spectroscopy (AA) for analysis. First of all, AA is not accurate enough in determining arsenic content in copper concentrates with more than 4% arsenic or in commercial grade arsenic trioxide. Accuracy in analyzing arsenic in these applications is important. Mine owners can pay a penalty in increased service

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charges depending upon the percentage of arsenic in their ore concentrates. Purchasers of ASARCO's arsenic trioxide demand that the product meet specified grade requirements. AA has not proved to be of sufficient accuracy for these purposes.

Moreover, the proposal is curious in that it requires graphite furnace AA for analysis of trace amounts of arsenic in Method 108A and arsine generation AA for analysis of similar ranges of arsenic concentrations in Method 108. We recognize that EPA and its contractors had only a short time to develop protocols for analysis of trace amounts of arsenic, but there should at least be agreement as to the AA method. Better yet, a laboratory should be able to evaluate and choose which technique best fits its laboratory sample matrices and budget. Arsine generation equipment would be \$2500 in addition to the cost of an AA spectrophotometer, while a graphite furnace would represent \$10,000 in additional cost over the cost of a spectrophotometer.

The problem of requiring two AA techniques aside, ASARCO's environmental laboratory in Salt Lake City has found that many sample matrices present serious analytical interference problems to either method of AA analysis. As a result, ASARCO uses a wet spectrophotometric procedure requiring arsine generation and a scrubber containing silver diethyldithiocarbamate (Ag - DDC, also known as a modified Gutzeit Procedure). Attachment C is the protocol. This procedure has significantly lower equipment costs and fewer interference problems than AA procedures, and has been shown in many laboratories over the years to produce accurate results.

4. Numerous papers on atomic absorption analysis of arsenic have shown that errors can result in comparing sample solutions containing

pentavalent arsenic to reference solutions containing trivalent arsenic. EPA's protocol results in a pentavalent sample, but the reference solution preparation protocol may not be rigorous enough to ensure that the reference solution is also pentavalent. The protocol uses nitric acid to oxidize arsenic (III) to arsenic (V), but such oxidation may take days. If the same reference solution is used over that time, the result could be a moving reference point and a possible error of as much as 10%. To eliminate this possibility, the protocol should provide for a rigorous technique to ensure oxidation. ASARCO recommends that the reference sample solution be heated after introduction of the nitric acid.

5. Finally, the sampling train in Method 108 has impingers for sampling SO_2 following the filters and impingers for catching arsenic. EPA Method 6 has traditionally been used to sample SO_2 emissions. Method 6 employs a technique requiring the titrations of SO_4 (resulting from the oxidation of SO_2) with a standard barium solution to a thorin indicator end point. The proposed Method 108 procedures use a standard sodium hydroxide and a phenolphthalein indicator. This SO_2 procedure has not been adequately field tested against Method 6. I believe that under certain conditions there is a strong likelihood that SO_2 might be scrubbed in the two impingers of the train used for condensible arsenic capture. This would result in low SO_2 determinations. The SO_2 portion of the Method 108 sampling train should be deleted from the method's protocol until the method's accuracy in sampling for SO_2 has been adequately tested.

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Attachment A

TACOMA PLANT
ASARCO INCORPORATED

VOLUMETRIC DETERMINATION OF ARSENIC
BY TITRATION WITH POTASSIUM BROMATE

1. To 1/2 gram sample, (500 ml flask) add 10 ml HNO_3 and 15 ml H_2SO_4 .
2. Fume to copious fumes on hot plate.
3. Cool. Add 100 ml H_2O .
4. Set on steam bath overnight, to evaporate H_2O and remaining HNO_3 .
5. Fume in A.M. to SO_3 fumes again.
6. Cool. Add 50 ml H_2O , 2 grams Sodium Bromide, 5 grams Ferrous Sulfate and 60 ml HCL .
7. Distill for 7 minutes (after solution starts to boil), collecting distillate in 400 ml beakers containing 100 ml H_2O . Keep tip of condenser tube just below surface of H_2O (See Diagram).
8. After 7 minutes, lower beaker from condenser tip and allow condenser to drain, add 60 ml HCL again from dispenser. (This will make 2 distillations with 60 ml HCL . Approximately 99% of the Arsenic will come over on the first distillation, the balance on the second.
9. Raise beaker to cover condenser tip and distill once more for 7 minutes. (Work fast in raising and lowering beaker and adding HCL in order to minimize any loss of arsenic.)
11. Lower beaker and flood residue with H_2O , remove flask from hot plate
11. Rinse condenser tube and tip with distilled H_2O .
12. Cover beaker with watch glass, heat to no more than 70°C .
13. Titrate at 70°C . with a few ml Methyl-Orange and Bromate solution. (Beat vigorously while adding the remaining few cc of bromate solution)

NOTE: For high Arsenic samples (As_2O_3) grade of 90% plus) where samples do not need to be broken down, apply the following procedure.

1. 1/2 gram sample (in 500 ml flask), add 50 ml H_2O , 2 grams Sodium Bromide, 5 grams Ferrous Sulfate and 60 ml HCL .
2. Connect as per diagram and distill to approximately 20 ml of solution left in flask.
3. Lower beaker from condenser tip, allow to drain, add 60 ml HCL once more and distill again to approximately 20 ml of solution
4. Titrate as above at 70°C .

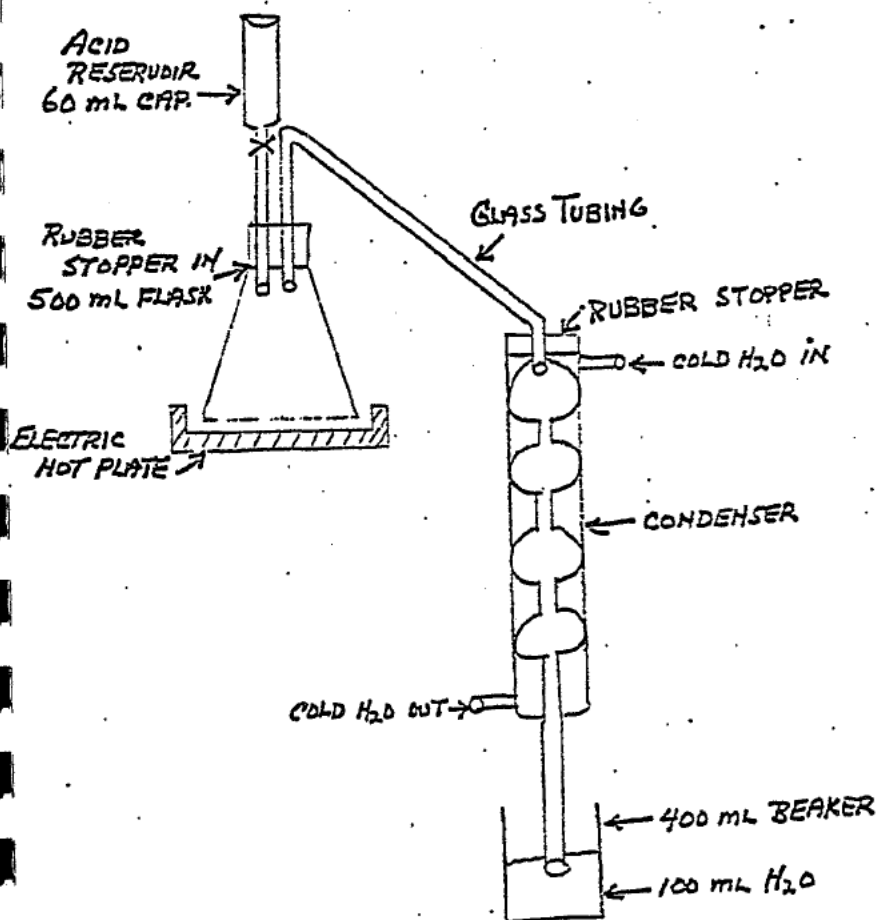
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POTASSIUM BROMATE SOLUTION:

144.50 grams KBrO_3 diluted to 50 liters with distilled H_2O .
Standardize against standard As_2O_3 or known As content material.

METHYL ORANGE INDICATOR:

2 grams Methyl Orange in 2 liters H_2O .



CEHochmuth
Tacoma, Washington
MAY 19, 1976

Attachment B

DETERMINATION OF ARSENIC IN SILICATE SLAGS BY FLAME
ATOMIC ABSORPTION (AA)

I. Scope and Application

This method covers the determination of arsenic in silicate slags in the concentration range from 0.5% to 3% of arsenic.

II. Summary of Method

The sample is dissolved in a mixture of acids-- HNO_3 , HCl , HF , HClO_4 . To ensure that no loss of arsenic occurs during sample decomposition as arsenious fluoride (AsF_3) and to oxidize all arsenic to the arsenic (V) valence state, it is critical that oxidizing acid conditions (HNO_3 and HCl) become established prior to the addition of HF . After taking to fumes of HClO_4 and diluting to a final volume of 10% (v/v) HCl , arsenic is measured by flame atomic absorption against matching arsenic (V) calibration solutions.

III. Interferences

None of the elements normally found in silicate slags interfere with this method.

IV. Concentration Range

The recommended range for arsenic is from 5-30 mg/100 ml.

V. Apparatus

Measurements are performed with an atomic absorption spectrophotometer and an arsenic electrodeless discharge lamp (EDL). The standard nitrous oxide-acetylene burner head is used with a reducing nitrous oxide-acetylene flame. The atomic absorption spectrophotometer will be considered satisfactory if the instrument can be adjusted to provide an absorption of zero for distilled water and at least 60% absorption (0.4 absorbance) for the following standard solutions:

<u>Element</u>	<u>Wavelength</u>	<u>Concentration</u>
Arsenic	193.7 nm	20 mg As (V)/100 ml
Arsenic	197.2 nm	20 mg As (V)/100 ml

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VI. Reagents

1. Preparation of Arsenic (III) Standard Solution

(1.0 ml = 1.0 mg As (III)) -- Dissolve 1.320 g NBS As_2O_3 in 100 ml of HCl in a 1-liter volumetric flask. CAUTION: Allow dissolution to take place at room temperature. Add 200 ml of water, cool, dilute to the mark with water and mix.

2. Preparation of Arsenic (V) Standard Calibration Solutions for AA

Pipet 0, 5, 10, 15, 20, 25, 30 ml of standard arsenic (III) solution (1.0 ml = 1.0 mg As (III)) into each of seven 250-ml copper assay flasks. Dilute to 30 ml with water. Add 10 ml HNO_3 , 5 ml HCl, 5 ml HClO_4 . Boil gently to approximately a 15-ml volume; add 3 ml additional HNO_3 and fume until the volume of HClO_4 is reduced to 2-3 ml; cool. Add 20 ml H_2O , 10 ml HCl; transfer to a 100-ml volumetric flask; dilute to the mark with water and mix.

For aspiration, transfer the solutions to 4-oz polyethylene bottles. When the solutions in the 4-oz bottles have been depleted to approximately 15 ml, discard and prepare new standards.

VII. Procedure

Transfer a 1 g sample weighed to the nearest 10 mg to a 100-ml teflon beaker. Carry a reagent blank along through all steps of this procedure. Dissolve the sample by adding the acids in the exact order as described. Add 15 ml HNO_3 and 3 ml HCl; heat gently to hasten dissolution. Add 15 ml HF cautiously; heat again. When most of the brown nitrous oxide fumes have subsided, add 8 ml HClO_4 and evaporate acid mixture until a volume of 15 ml is reached. Add 3 ml of additional HNO_3 and fume until volume of HClO_4 is reduced to 2-3 ml; cool. Add 20 ml water, 10 ml HCl; cover and warm until soluble salts are in solution; cool. Transfer to a 100-ml volumetric flask; dilute to the mark with water and mix. Arsenic present in sample is now known to be in the As (V) valence state.

In the concentration mode and with curvature correction, if necessary, measure the arsenic content in the test solution by AA using the conditions described under Section (V), Apparatus

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VII. Procedure, contd.

against As (V) calibration solutions described under Section (VI), Reagents. Alternatively, prepare a calibration curve for arsenic by plotting the net absorbance values of the calibration solutions against milligrams of As (V) per 100 ml. Convert the net absorbance values of the test solution to milligrams of arsenic per 100 ml by means of the calibration curve.

VIII. Calculations

Calculate the percentage of arsenic in the sample according to:

$$\% \text{ (As)} = \frac{(A-B) \times 100}{C}$$

where A = milligrams of As found in 100 ml of the final test solution.

B = milligrams of As (if any) found in 100 ml of the final reagent blank solution.

C = milligrams of sample present in 100 ml of the final test solution.

G. J. Salandra
October 1977
bsk

COLORIMETRIC DETERMINATION OF ARSENICAbstract

The colorimetric method for the detection and estimation of traces of arsenic is based on the reaction of arsine with a pyridine solution of silver diethyldithiocarbamate producing an intense red color.

In order to produce arsine, hydrochloric acid, sulfuric acid, potassium iodide and stannous chloride are added to the digested sample solution to convert all the pentavalent arsenic to trivalent form. Then proper amounts of zinc granules are carefully inserted to produce hydrogen which reacts immediately with the trivalent arsenic in solution to evolve arsine.

The gases produced from the above reactions usually contain traces of H_2S from the reduction of sulfur compounds present in the sample. Since H_2S forms a brown-colored compound with silver diethyldithiocarbamate, it would interfere with the detection and estimation of arsine; therefore the gases are passed through the glass wool impregnated with lead acetate which absorbs the H_2S .

After converting the arsenic to arsine and freeing it from H_2S , it is absorbed in a pyridine solution of silver diethyldithiocarbamate. The color intensity of the pyridine solution is measured in the calibration curve, then the amount of arsenic in sample is determined.

The material analyzed should not contain any compound which would interfere with arsine formation, such as Pt^{+++} , Ni^{++} , Co^{++} , Br_2 , Cl_2 , and HNO_3 , etc.

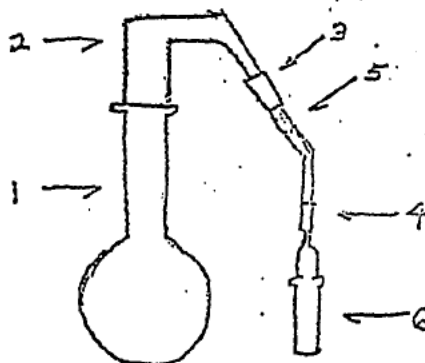
MethodI. Reagents:

1. Potassium Iodide - 15% KI - 75 grams of Baker analyzed reagent grade potassium iodide brought to 500 ml. volume with deionized water.
2. Stannous Chloride - 40% $SnCl_2$ - 40 grams of Baker analyzed reagent grade stannous chloride brought to 100 ml. volume with 6N HCl.
3. Hydrochloric Acid - 6N HCl - 50 ml. of Baker analyzed reagent grade concentrated hydrochloric acid brought to 100 ml volume with deionized water.
4. Sulfuric Acid - Concentrated H_2SO_4 - Baker analyzed reagent grade.
5. Zinc - Zinc granule - Baker analyzed reagent grade granular

zinc, 10 mesh.

6. Lead Acetate - 10% $\text{Pb}(\text{CH}_3\text{COO})_2$ - 11.93 grams of Baker analyzed reagent grade lead acetate. $\text{Pb}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$ brought to 100 ml. volume with deionized water.
7. Silver Diethyldithiocarbamate
 - a. Dissolve 12.9 grams of Eastman analytical grade diethyldithiocarbamate acid sodium salt, $(\text{C}_2\text{H}_5)_2\text{NCSSNa} \cdot 3\text{H}_2\text{O}$ in 500 ml. deionized water. Filter the DDC for best results.
 - b. Dissolve 10.2 grams of Baker analyzed reagent grade silver nitrate in 600 ml. deionized water.
 - c. Mix diethyldithiocarbamate acid sodium salt solution with silver nitrate solution, then silver diethyldithiocarbamate precipitate is formed.
 - d. Filter the precipitate, then wash it well with deionized water.
 - e. Dry the precipitate without heat.
8. Pyridine Solution of silver diethyldithiocarbamate (S.D.D.C.) Weigh out 2.5 grams of S.D.D.C. Using small amounts of pyridine dissolve S.D.D.C. and transfer to 500 ml. volumetric flask. Bring to 500 ml. volume with Baker analyzed reagent grade pyridine. Filter with Buchner funnel and store.
9. Arsenic Stock Solution - 1000ppm As solution - 1.320 grams of Baker analyzed reagent grade As_2O_3 are dissolved in 5 ml. of 15% NaOH , put in a 1 liter volumetric flask and made to volume with deionized water.
10. Arsenic Standard Solution - 1 ppm As Solution - The standard solution is prepared fresh each day from the stock solution described above by diluting 1 ml. \rightarrow 1 liter.
11. Acetone - Baker analyzed reagent grade.

II. Equipment:



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1. A 250 ml. round bottomed flask with an elongated neck with 29/42 ground glass joint.
2. Condenser with 29/42 ground glass joint. The body of the condenser is wrapped with gauze which is wet with water when in use.
3. Approximately 1 inch of rubber tubings. No rubber (or minimum) should be exposed in tubing connections as it absorbs arsine.
4. Homemade elbow joint, the shaded upper end of which contains a glass wool plug. This plug has been previously saturated with a 10% lead acetate solution and thoroughly dried. A plug is considered good until it turns 3/4 black.
5. Greenburg impinger.
6. Water bath in which to immerse flask bulb.
7. Evelyn Photoelectric Colorimeter, Rubicon Co., Philadelphia.
8. Colorimeter tubes.

VII. Procedure:

1. Samples are digested with HNO_3 and HClO_4 . Be sure the concentrated HNO_3 is fumed off.
2. Put sample or standard solution into reaction flask and add water until solution level is half way up bulb flask ≈ 50 ml.
3. Add 5 ml. of concentrated H_2SO_4 and shake.
4. Add 10 ml. of 6N HCl and shake.
5. Place on stand and add 5 ml. of 15% KI .
6. Let stand for 5 minutes or until a light pale yellow color appears.
7. Add 0.4 ml. of 40% SnCl_2 to sample. Shake well until clear.
8. Wet gauze on condenser and attach to reaction flask.
9. Sample is placed in boiling water bath and the impinger tube containing 10 ml of pyridine - S.D.D.C. solution is attached
10. As quickly as possible the condenser should be removed, 3 grams of zinc granules added to reaction flask, and condenser replaced.

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11. Sample should boil vigorously for 15-20 minutes or until bubbling ceases in reaction flask.
12. Impinger tube is removed and pyridine - S.D.D.C. solution is placed in colorimeter tube and read the transmittance % at 540 m μ .
13. Standards from 1 ppm As solution are run as follows - blank, 1 μ , 2 μ , 3 μ , 5 μ , 10 μ , 15 μ , 20 μ and a calibration curve of transmittance % vs. total μ of As is plotted.
14. It is important to clean the glassware in following ways:
 - a. Remove all traces of zinc from reaction flask.
 - b. Impinger tubes and colorimeter tubes are washed with acetone and placed in oven to dry.
 - c. Impinger tubes, colorimeter tubes, and condenser assemble must be completely dry inside before reusing.

Discussion

There are several reasons for choosing pyridine as the solvent better than other organic solvents. It is known that arsine and silver diethyldithiocarbamate are readily soluble in pyridine which is of tremendous importance for the quantitative determination. Also the color developed by the reaction of arsine with pyridine - S.D.D.C. solution is permanent, its light absorption will not change even after several hours. Furthermore, the easily prepared silver diethyldithiocarbamate and its pyridine solution are very stable and will not deteriorate even after considerable time nor exposed to direct light.

This method can easily be adjusted for the determination of smaller or larger amounts of arsenic by the proper choice of the amount of absorbing solution. The arsenic recovery of this method is about 98%.

The advantages of this colorimetric method are its simplicity, great sensitivity and high reproducibility. It is evident this method is very useful for the quantitative and qualitative determination of arsenic in biological materials and other various materials, chemicals, etc.

Natural Resources Defense Council, Inc.

1725 I STREET, N.W.
SUITE 600
WASHINGTON, D.C. 20006
202 223-8210

New York Office
122 EAST 42ND STREET
NEW YORK, N.Y. 10168
212 949-0049

Western Office
25 KEARNY STREET
SAN FRANCISCO, CALIF. 94108
415 421-6561

STATEMENT OF
DAVID D. DONIGER
SENIOR STAFF ATTORNEY

ON THE
PROPOSED NATIONAL EMISSION STANDARDS FOR
EMISSIONS OF ARSENIC

PUBLIC HEARINGS
WASHINGTON, D.C.

NOVEMBER 8, 1983

New England Office: 16 PRESCOTT STREET • WELLESLEY HILLS, MA. 02181 • 617 237-0472
Public Lands Institute: 1720 RACE STREET • DENVER, CO. 80206 • 303 377-9740

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My name is David Doniger. I am speaking on behalf of the Natural Resources Defense Council, a citizen organization with more than 30,000 members nationwide who are dedicated to the protection of public health and the natural environment. Many of NRDC's members live in the vicinity of sources of arsenic emissions. My remarks today are preliminary, presenting an overview of NRDC's concerns. We intend to submit detailed written comments by the end of the comment period.

In our judgment, the proposals published in July are grossly inadequate to protect public health. EPA has failed to require sufficient control measures for the source categories slated to be regulated; numerous opportunities for arsenic control have been overlooked. EPA has not justified not proposing standards for certain sources within the categories that are slated for regulation, and for additional source categories which are proposed to be exempted from standards entirely. EPA has accepted companies' claims of technological or economic infeasibility at the companies' word, without requiring any substantial proof. In short, EPA has failed to "do its homework."

In the first part of these comments, I wish to focus on two basic faults in the Agency's approach to these proposals. First, EPA has tried to hide its failure to do its homework under a veneer of "expert" judgments and vague statements. Rather than devote the necessary personnel and resources to the task, EPA has tried to construct elaborate rationales for not acting -- for not requiring at the smelters anything other than converter air

well as other categories not discussed in the proposal (such as coal-fired utility and industrial boilers). These comments will also be supplemented later.

Fourth, I will address the "alternative" approach being pushed by the Agency's Policy Office. This approach, in our view, sets incredibly high triggers for any regulatory action. It also suggests that the degree of health protection to which a person is entitled should be a function of how many neighbors he or she has. NRDC categorically rejects this fundamentally unfair suggestion.

PART I

A. EPA CANNOT HIDE ITS FAILURE TO COMMIT THE RESOURCES NECESSARY TO PREPARE ADEQUATE PROPOSALS BEHIND FLIMSY "EXPERT JUDGMENTS"

The July notice and the background documents contain literally dozens of determinations as to the extent of emissions, the availability of controls, whether to regulate or not, and in what degree and manner to regulate. In these documents, the Agency has tried to place a veneer of "expert judgment" over these choices. Many of these "judgments" are the most vaguely worded statements, worded in the passive tense, devoid of any apparent evidentiary support. Many have only the flimsiest foundation -- or no foundation at all.

Of all these "judgments" in the proposals, two are the most troubling: (1) the reasons offered to justify not proposing standards for anything but copper smelters and glass makers and

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responsibility to come to Congress and seek them.

The resource shortage which afflicted these proposals in the past may not be the fault of the staff-level people in this room. In fact, to the extent that we are talking about events which occurred before the tenure of EPA's present top officials, it may not even be their fault. But now EPA must face up to what is necessary to rectify the shortcomings of these proposals. A very considerable amount of work remains to be done. The statutory deadlines cannot be ignored.

B. THE CLEAN AIR ACT'S MANDATE IS TO PROTECT PUBLIC HEALTH, NOT TO PIT PEOPLE AGAINST ONE ANOTHER IN FALSE CHOICES BETWEEN JOBS AND HEALTH

The hearing just concluded in Tacoma established that control of arsenic better than EPA proposed can be achieved at that smelter. The same for all the sources under review. With diligence, EPA will be able to identify many additional control opportunities. As already indicated, EPA has made no real effort to determine the validity of industry claims of financial incapacity.

Instead of seeing to it that the Agency had fully explored the range of control options available to curb arsenic emissions, Administrator Ruckelshaus chose to confront the people of Tacoma with what has turned out to be a false choice between jobs and health. The Administrator apparently sought thereby to make a case for giving EPA more discretion to balance cost and benefits.

We believe this experience demonstrates that, to the contrary, EPA needs a strong, health-oriented control mandate.

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PART II

A. GENERIC ISSUES IN THE IMPLEMENTATION OF SECTION 112

1. The Test for Delisting

Section 112 of the Clean Air Act defines hazardous air pollutants as substances that "cause, or contribute to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." Based on the evidence that arsenic causes various forms of cancer, EPA correctly concluded that the substance is a hazardous air pollutant and so listed it in 1980.

NRDC strongly supports the listing of arsenic as a hazardous air pollutant. This decision is fully justified by information presented in the Health Assessment Document and elsewhere in the rulemaking docket.^{1/} We are not aware of any party which, to this point at least, has vigorously quarrelled with the listing of arsenic as a hazardous air pollutant under Section 112 of the Clean Air Act. In anticipation, however, I would like to briefly address the legal standards that would govern any such argument.

^{1/} This comment should not be taken to imply that NRDC accepts EPA's current process for making a listing determination. As explained in other comments and in testimony to the Congress, we believe EPA has greatly exaggerated the requirements for listing a pollutant. The "hurdle" imposed by the Clean Air Act is much lower than EPA has recently suggested. The listing decision is supposed to be informed by EPA's statutory duty to take a "precautionary" approach -- to play it safe rather than sorry when lives and health are at stake. Unfortunately, the precautionary approach mandated by Congress is not being respected.

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However, NRDC does not agree with EPA's enormous leap to the conclusion that the absence of identifiable thresholds permits the Agency to make costs the dominant factor and to drop down to standards that require no more than mediocre pollution controls.

NRDC's analysis of the statute and legislative history of Section 112 have been made available to the Agency in our recent comments (with EDF) on EPA's draft policy paper on toxic air pollutants.^{2/} These comments are incorporated by reference.

To recap briefly, NRDC does not believe Section 112 of the Clean Air Act gives EPA any authority to perform cost-benefit analyses in order to set hazardous pollutant standards. That, however, is exactly what EPA has done in these proposals.

The Agency previously has asserted the following test for hazardous air pollutant standards. First, EPA defines the "Best Available Technology" (BAT), defined as "the most advanced level of controls adequately demonstrated considering economic, energy, and environmental impacts." This definition has been grafted onto Section 112 from Section 111, the provisions of the Act governing New Source Performance Standards and pollutants which are, on a relative quantity basis, less dangerous than hazardous air pollutants. Second, EPA says it examines the residual risk, after application of BAT. If that risk is judged to be

^{2/} "Comments of the Natural Resources Defense Council and the Environmental Defense Fund on the OAQPS Draft Toxic Air Pollutant Strategy (October 7, 1982) and the OPRM Comments (November 15, 1982)," December 16, 1982 and "Comments of the Environmental Defense Fund and the Natural Resources Defense Council on the Environmental Protection Agency's Proposed Process for Evaluation and Control of Toxic Air Pollutants," June 10, 1983.

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the minimum level of control even considered.

In some industries -- smelting being a prime example -- the level of performance achieved to date is substantially less than can be reasonably forecast even under a lenient technology test. In these cases, standards will have to be genuinely technology-forcing, requiring genuine advances in emission control designs and operation.

In our comments on the recent EPA policy paper, NRDC and EDF have suggested the following approach to setting hazardous pollutant standards. First, all sources of significant amounts of arsenic emissions should be subject to standards.

Second, these standards, at a minimum, should reflect the lowest emission rate achievable by use of the most effective control technologies capable of being used.

Only at this point is there any legitimate use, in our opinion, for risk assessments. If the emissions remaining after application of genuinely best technology are predicted to add to the lifetime risk of cancer or other fatal or very serious diseases of the most exposed individuals by an amount greater than one in a million, then further technological improvements should be required to reduce the additional risks.

This test for standard setting would preserve the main thrust of Section 112 -- a focus on maximum reduction of health risks. Unlike EPA's "BAT/unreasonable residual risk" amalgam, this test does not allow cost-benefit analysis to compromise health protection from hazardous air pollutants. In this instance, it requires genuinely technology-forcing standards --

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cause sources to close. These claims are almost completely undocumented and unsubstantiated. In several places the notice admits that almost all economic information on which EPA has relied has come, in an unsubstantiated form, from the regulated firms. In my discussions with EPA staff since the July notice was published, staff have reiterated this admission in even more candid terms. The July notice implies that EPA lacks a means with which to verify the companies' claims.

The Agency, however, does have the means to secure the information it needs. Under Section 114 of the Act, any necessary information can be requested. Moreover, EPA has the subpoena power to back up its information requests.

Long ago, EPA should have begun "playing hardball" on this critical issue. It should have been asking all arsenic sources asserting an economic limitation to provide verifiable documentation of their claims. This documentation should have included such internal financial planning documents as the companies prepare for their own use; this is the only way to assure that the Agency receives a straight sense of what a company is telling itself. These requests should have contained deadlines. They should have been backed up by threats to use the Agency's subpoena power -- a few exercises of which would probably greatly enhance the Agency's access to information generally.

To our knowledge, however, only one copper smelter (ASARCO-Tacoma) has been asked economic questions in a Section 114 request, and this occurred only in September of this year.

Emissions and risk estimates have shifted since the July proposal was released. Another EPA emissions estimate released in October asserts substantially lower emission rates overall -- one third to one half the previous estimate -- although estimates for some emission points are raised; NRDC has not yet reviewed the new analysis. The initial modelling assumed that the surrounding terrain was flat and that arsenic dispersed as a gas. In fact, however, the terrain is somewhat hilly and the low-altitude fugitive emissions primarily take the form of particles, at least soon after they are discharged. Both factors may result in increased estimates of public exposure. New dispersion modelling is underway, pursuant to a contract to PEDCo, to take into account the area's hilly terrain. The PEDCo analysis, however, is still being conducted under the assumption that arsenic is a gas. NRDC does not understand the reasons for this.

After all the reanalysis, there will still be a very high rate of arsenic emissions from this plant. The very high public exposure warrants the most stringent possible standard. Unfortunately, the proposal is anything but stringent.

There are dozens, perhaps hundreds, of arsenic emission

lead NRDC to conclude that the Agency is over-confident in its prediction that the risks are not likely to exceed these estimates.

Obviously, the risks could also be lower than EPA projects. But as explained above, the fundamental policy of the Clean Air Act is one of caution, of playing it safe rather than sorry when dealing with the lives and health of the American people. Thus, EPA has a special obligation to take care not to underestimate the risks.

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feasible control strategy available to ASARCO is the one measure that would free it from another regulatory requirement.

In addition to the air curtains on the converters, PSAPCA regulations require ASARCO to curb SO₂ emissions by 90 percent in the next several years. According to ASARCO, the most promising means of accomplishing this reduction is by installation of a "flash smelting" process patterned after that in use by INCO in Canada. This process promises dramatic reductions in arsenic emissions as well as SO₂. Such a furnace is being brought on line now at ASARCO's Hayden smelter. It should be possible to test this unit with high-arsenic feed by the end of this year, and to determine what modifications, if any, will be needed to enable use of high-arsenic feed.

EPA should require the promptest possible completion of such tests. EPA should participate in these tests and their evaluation. If the process is compatible with the Tacoma operation, its installation should be required by the earliest possible date.

There are new technology options available to replace the old and outmoded arsenic kitchens as well. The standard should require this modernization project as well.

Commenters in Tacoma pointed to a vast number of opportunities to control other fugitive emission sources within the plant. Attention to these is even more important given EPA's October re-estimation of emission rates, for the emissions from such points now appear to be an even more substantial fraction of total emissions. The Agency assumption that the Tripartite

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allegedly posed by the other smelters are matters of grave concern.

NRDC believes secondary air curtain hooding should be required on the converters of all these smelters. This is a clearly available control technology. It is part of the minimum which should be required of every significant emitter of arsenic. Similarly, all of the copper should be required to control other sources of fugitive emissions, as we have recommended regarding Tacoma.

Our written comments will address control opportunities at the 14 low-arsenic smelters in greater detail.

D. GLASS MANUFACTURE

NRDC is not satisfied that all feasible control opportunities have been exhausted for the glass making facilities. In addition, NRDC intends to look more closely into the market justifications presented for arsenic-containing glass. It may be that the appropriate standard for this source category is to restrict or eliminate the use of arsenic in glass making. We will comment on this further in our written comments.

E. CATEGORIES EXEMPTED FROM STANDARDS

EPA has proposed not to regulate a number of source categories despite the fact that they emit substantial quantities of arsenic. Categories discussed in the July proposal include primary lead smelters, primary zinc smelters, zinc oxide plants, arsenic chemical manufacturing plants, cotton gins, and secondary

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contended that EPA should take a comprehensive approach to this source category. I reference that portion of those comments (pages 29-33) here.

Coal-fired boiler emissions contain a wide variety of substances that are listed or are under consideration for listing as hazardous air pollutants, including radionuclides, arsenic, beryllium, cadmium, chromium, mercury, manganese, lead, and nickel. See the tables included in our radionuclide comments at pp. 31-32. A significant opportunity is presented here to capture a stream of pollutants in one fell swoop.

This opportunity should be of great interest to those in the Agency who advocate re-orienting the Section 112 control program to a source-category-by-source-category basis. Yet it has received no attention, so far as we are aware, in this proceeding. That omission cannot be accepted.

E. COMMENTS ON THE "ALTERNATIVE" APPROACH

In the section of the proposal on low-arsenic smelters, the July notice discusses an "alternative" approach: a table presenting various combinations of maximum lifetime individual risk and annual community incidence which would determine whether to set standards. These combination would also serve to limit how much to regulate in cases where any controls at all were required.

NRDC categorically rejects this proposed alternative. First, it is fundamentally unacceptable to make the degree of protection to which a person is entitled a function of how many

SIERRA CLUB



330 Pennsylvania Avenue, S.E.
Washington, D.C. 20003 (202) 547-1141

November 8, 1993

Attachment 13 of A-80-40 IV-F-2

Central Docket Section (LE-131),
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C.

Docket Number OAQPS-79-8, A-83-40

These comments are provided on behalf of the Sierra Club in response to a Proposed Standards for Inorganic Arsenic published 48 Federal Register 33112, July 20, 1983.

General Comments

The Sierra Club vigorously objects to the final promulgation of the subject proposed National Emission Standards for Inorganic Arsenic in their current form. As currently proposed, the regulations fail to provide the protection of public health called for in Section 112 of the Clean Air Act.

Section 112 quite clearly directs the Administrator to set a standard which provides an ample margin of safety to protect the public health. The Background statement discusses the difficulty of implementing this requirement with regard to carcinogens or other air pollutants which appear to have no dose below which exposure is considered to be safe. EPA observes that the only exposure at which no risk would be posed would be a standard prohibiting all emissions of the pollutant. The EPA then proceeds to use this incongruity to reinterpret the requirements to focus not on providing the greatest degree of health protection that is technically feasible, but rather a degree of protection which the Agency determines to be affordable by the facilities discharging arsenic. In a general sense, this approach essentially means that those industries that have done the least over the last decade to reduce pollution will be allowed to impose the highest risk on the public because such facilities will have to pay the most to clean up. This formulation essentially grants a competitive edge to the least conscientious facility in an industry group and penalizes those which have shown initiative in emissions control.

However, even the EPA determination of affordability is based on generalized data with little detailed economic data to demonstrate the inability of these facilities to afford greater

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levels of emission control. Since the EPA is proposing to allow emission rates of arsenic which would create levels of risk which are higher than the protections provided by any previous carcinogen regulations issued under a public health statute, the EPA ought to at least obtain from the facilities, and make available to the public, detailed economic justification for such requirements. The explanation in the preamble to the regulations indicates that the affected companies have not shared this information with EPA. For instance, the preamble states, "Without specific and detailed knowledge of all economic information, which is known only to ASARCO, EPA cannot estimate with certainty the extent to which production curtailment or limitation on inorganic arsenic feed rate may be affordable." This is not an acceptable excuse for the imposition of excessive cancer risks to the residents of Tacoma. Moreover, the precedent set for the evaluation of the ability of other facilities to control deadly pollutants is likewise unacceptable.

By any interpretation one would think that the "ample margin of safety" requirement in Section 112 would require that the Administrator not create risks any greater than the requirements placed upon emissions of other hazardous air pollutants or the requirements implementing other public health statutes. For instance, EPA regulations restricting emissions of vinyl chloride reduce the lifetime risk to 1 in 1 million. Indeed, an examination of the relative carcinogenic potencies among 52 chemicals found in the Health Assessment document for arsenic (p. 5-145) shows that arsenic is approximately three times more potent than vinyl chloride for which emissions standards were set at zero for many major sources. Arsenic is of the same relative carcinogenic potency as DDT, EDB, chlordane, and heptachlor, all of which have been banned by EPA regulation under FIFRA which does not impose as stringent a requirement for regulation as an "ample margin of safety" standard. The lifetime risk of cancer imposed by the proposed rule on residents neighboring the ASARCO-Tacoma smelter would be 0.58 to 9.2 in 100. While the lifetime risk to residents of low-arsenic copper smelters would be lower, rates would still range from .23 to 3.6 per 100 at ASARCO-Hayden and .094 to 1.5 per 100 at Phelps Dodge-Douglas.

If this is the level of risk EPA would propose to permit under a "margin of safety" mandate, we shudder to speculate what level of protection the Agency might provide where the statutory mandate is not as explicit. Indeed, the Sierra Club urges EPA as part of this rulemaking to compare the levels of risk posed to the neighbors at each of the affected facilities with that computed for those exposed to other regulated hazardous air pollutants as well as other regulated carcinogens.

Specific Comments on ASARCO-Tacoma

The regulations proposed for this facility essentially propose as BAT those requirements which the facility is already required to comply with in order to control particulates and SO₂

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under other provisions of the Clean Air Act. This includes the application of air curtain secondary hoods on the converter operation which would be required by 1998 when production curtailment would no longer be a allowable means of meeting the ambient air quality standard for SO2.

We oppose the reliance by EPA on the OSHA requirements which are aimed at capturing and controlling secondary emissions from a variety of operations. The inclusion of these requirements as Section 112 standards would provide significantly greater flexibility in enforcing these requirements. In addition, an examination of the Tri-partite agreement shows that many of the engineering requirements are not necessarily mandatory, but require ASARCO to examine the "feasibility" or "effectiveness" of various requirements with no clear criterion as to what specifically will be required. Of particular importance is the vague commitment on the part of ASARCO to examine the use of oxygen furnace technology in the roaster and reverberatory furnaces. It is not clear whether EPA examined the possibility of requiring this technology as BAT and the consequent improvements which would be derived in arsenic control. ASARCO has already agreed to use this technology at its facility in Hayden, Arizona.

Comments on Low Arsenic Feed Smelters

The approach apparently taken by EPA in examining the health impacts on this category of smelters is that since the lifetime cancer risk is lower than that calculated for residents surrounding ASARCO-Tacoma, concern for health should be correspondingly lower. We can think of no other reason why EPA would fail to allow a hearing in the regions where these smelters are located. Of particular concern to the Sierra Club is the apparent lack of evaluation of the health risk posed to those people living in areas subjected to overlapping emissions from more than one smelter. EPA should examine the impacts of emissions in the Hayden-Winkelman area, as well as the impacts of the Douglas-Cananea-Nacozari complex.

Again, the economic justification for the failure to require identified technologies is not of sufficient detail in light of the significant risks posed by these facilities. This is particularly true of the "high-risk" facilities identified by EPA. The history of the smelting industry has been one of resistance to pollution control requirements in general and a reliance of the cyclical nature of copper sales to provide the economic basis for not complying with Clean Air Act requirements. Several of these facilities have never had significant investment in modernization of the basic facility which would result in more competitive and also cleaner, less polluting facilities. Should EPA promulgate these proposed regulations as final, it should seriously consider requiring capital investment set-asides which would be available for capital improvements when EPA re-examines BAT requirements after five years.

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